Rock Products

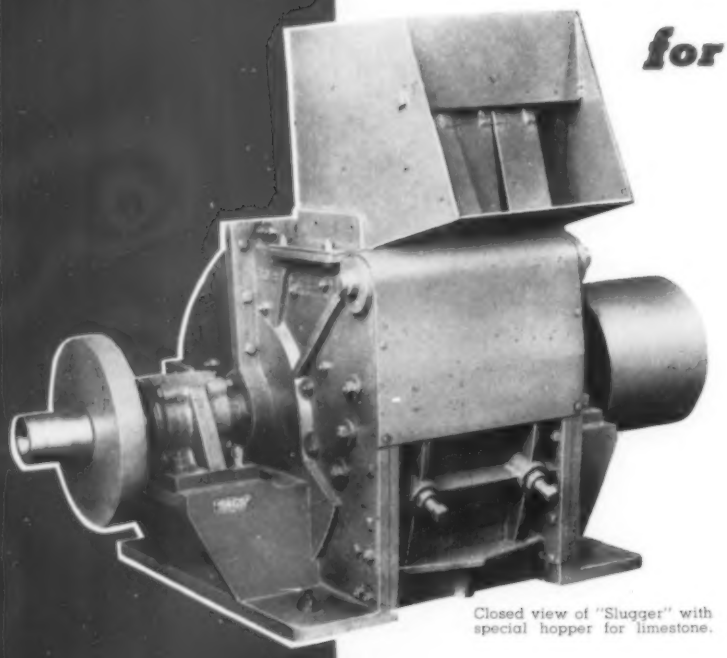
THE INDUSTRY'S RECOGNIZED AUTHORITY

NOVEMBER, 1939

THE WILLIAMS "SLUGGER"

Crusher and Pulverizer

for AGRICULTURAL LIMESTONE



Closed view of "Slugger" with special hopper for limestone.

You can now crush large pieces of stone weighing from 75 to 100 pounds to agricultural limestone in One Operation with the Williams "Slugger". This not only eliminates sledging, but also does away with the unnecessary expense of a primary crusher.

The "Slugger" represents the most advanced type of crushing equipment on the market today and with seven sizes to choose from producing from 4 to 30 tons per hour, every producer whether large or small can now afford to install a Williams.

Also Crushes "One Man" Size Stone to 1¼" or ¾" in One Operation

By also reducing large rock to 1¼" or ¾" in one operation, the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment.

Open view of "Slugger" showing heavy duty hammers, liners and discs

SEVEN SIZES

30 TO 150 HORSEPOWER

The Williams Patent Crusher & Pulverizer Co.
800 ST. LOUIS AVE. ST. LOUIS, MO.

SALES AGENCIES IN ALL PRINCIPAL CITIES INCLUDING

Chicago	NEW YORK	Oakland, Calif.
37 W. Van Buren St.	15 Park Row	1629 Telegraph Ave.

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

Williams

PATENT CRUSHERS GRINDERS SHREDDERS

Sand Classification

AT LOWEST COST CALLS FOR THE RIGHT EQUIPMENT

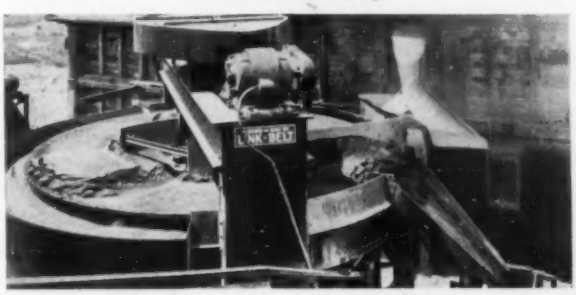
● Link-Belt offers five types of settling and dewatering devices to meet varying conditions found in different pits. These units, described on this page, have been developed and used in many applications to give the required grading, cleansing or dewatering to meet local specifications. Send for special literature.

LINK-BELT COMPANY Chicago Philadelphia Indianapolis Atlanta
San Francisco Toronto Offices in Principal Cities 7039

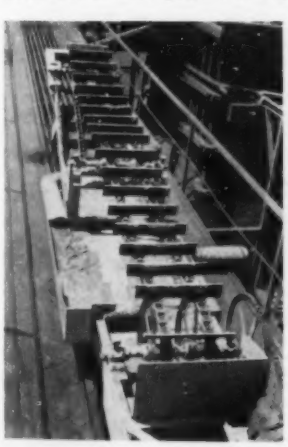
Power Operated Units Produce a DRYER Sand

Many washing plants, particularly those loading trucks, require a sand with a smaller percentage of water than can be obtained with any type of settler having automatic sand discharging mechanism. To meet this need, Link-Belt manufactures the 3 kinds of power operated dewatering devices as shown here.

The Rotoscoop



This unit fills the need for a sand dewatering device that will catch the available sand grains of sufficient fineness to meet present day specifications, and deliver the product dry enough to permit truck transportation, or conveying to and from storage by belt conveyors. It is made in four sizes, 15′, 12′, 9′ and 6′ diameters. It consists of a large circular steel tank, together with a rotating disk carrying inclined scoops. Capacities varying from 25 to 150 tons per hour, can be lifted from the large settling area, with the water largely displaced from the voids through a squeezing action peculiar to this device. Because the inlet and discharge are on about the same level, little head room is required. It is entirely self-contained, with motor and driving machinery. A unique feature is that the entire area of the tank is submerged, and utilized for settling purposes. The slow motion of the scoop does not hinder good settling.



Dewatering Flight Conveyor

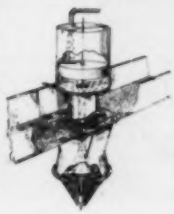
The stream of sand and water is fed into the tank near the center. The settling sand is slowly dragged, by the flights, out of the water, up an incline of proper length, and at a proper speed, to give the drainage required. The dirt and water flow out at the end of the tank opposite the sand discharge. The tank can be made of either steel or wood. By using a fine sand launder and two Dewatering Flight Conveyors, or by arranging two Dewatering Flight Conveyors in series, a coarse and a fine sand can be produced.

Dewatering Screw Conveyor

The screw has a scrubbing action on the sand, and keeps the loam and other foreign matter in suspension, to be carried away in the overflow. Thus a clean and dry sand is secured for use where specifications and inspection are rigid. Also, the screw can be regulated either to reclaim the fine sand, or allow it to pass out at the overflow. By using two units in series, the coarser sands can be reclaimed for concrete sand, and the finer for plaster sand.

Accurate Grading with the SHAW Classifier

This unit will not only produce clean commercial sand but will also make such special grades as asphalt, filter, engine, gypsum and glass sands. It employs a combination of surface current and rising current classification. By using in series, two or more grades of sand can be made at the same time, or mixed into any combination desired. Not only can the sand be graded, but leaves, dirt, etc., can be removed. The dirty wash water is replaced by clean water, so that the small quantity of water which does go with the sand, carries no dirt or silt. Sand graded and cleaned by this unit will meet the most exacting specifications, particularly where removal of fines is important.



Automatic Conical Separator

This less expensive device meets satisfactorily all the requirements in the degree of separation called for by many local specifications. It is reliable—has been proved by satisfactory separation for 23 years or more in many plants throughout the country. Soil water and scoured sand from the screens are delivered into the conical body of the separator. The sand settles to the bottom and gradually accumulates, while the water overflows and runs continuously out of the spill-way, carrying away with it the impurities in suspension. Made in 3 sizes, in capacities up to 2000 gallons of water per minute.

LINK-BELT
· HANDLING ·
PREPARATION
EQUIPMENT

NEXT MONTH'S ISSUE

The December issue will literally take the reader on a tour to the West Coast where he may inspect some of the interesting developments in the rock products industry without leaving his desk. Cement companies on the Coast have contributed many of the advances in this industry, and in the coming issue some unique methods adopted by one company in its modernization program will be described. One of the largest plants in the country producing crushed stone, sand and gravel will be described. Ready mixed concrete will be represented with a story about "electric eye" control for batching, and some of the unusual equipment for the production of special concrete products will be described and illustrated. Readers also will be interested in following up the two interesting series of articles by Elwood T. Nettleton on stone crushing methods and specifications and on sand classification by Edmund Shaw.

Cement Mill Controls

To maintain maximum efficiency, this large cement company has a very elaborate system of control devices for slurry mixture, kilns, and continuous thermometer for compartment mill operation on clinker. For high-early-strength cement, the first stage of clinker grinding is in closed-circuit with a final grind in a secondary compartment mill operating as a tube mill.

Aggregates

A 400-ton per hour rock, sand and gravel plant depends almost entirely on Diesel tractors and excavators for moving material to the plant and also for reloading from stockpiles. Some very substantial economies are claimed for the methods employed.

Ready Mixed Concrete

One of the most completely automatic plants was recently opened up. It features "electric eye" control, pneumatically operated bin gates, and it has a capacity of 150 cu. yd. of concrete per hour.

New Concrete Products

The so-called Underdown system of manufacturing concrete products will interest many readers. This plant also uses the straight line production method so familiar in automobile manufacturing, and places concrete by vibration from a central mixer into a continuous line of forms moving over a track at the rate of 5 ft. per minute.

Hints and Helps

Practical information of value to plant superintendents, chemists, and other supervisory officials may be found every month in the department headed, Hints and Helps. Readers have found this section a veritable gold mine of time and money saving ideas, and the coming issue will have some unusually interesting articles.

ROCK PRODUCTS

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

VOL. 42, No. 11

Contents for November, 1939

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ROCK PRODUCTS Bears the Twin Hall-Marks of Known Value.

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Authentic facts relating to editorial scope and readership analysis. → ABP

(PUBLISHED MONTHLY)

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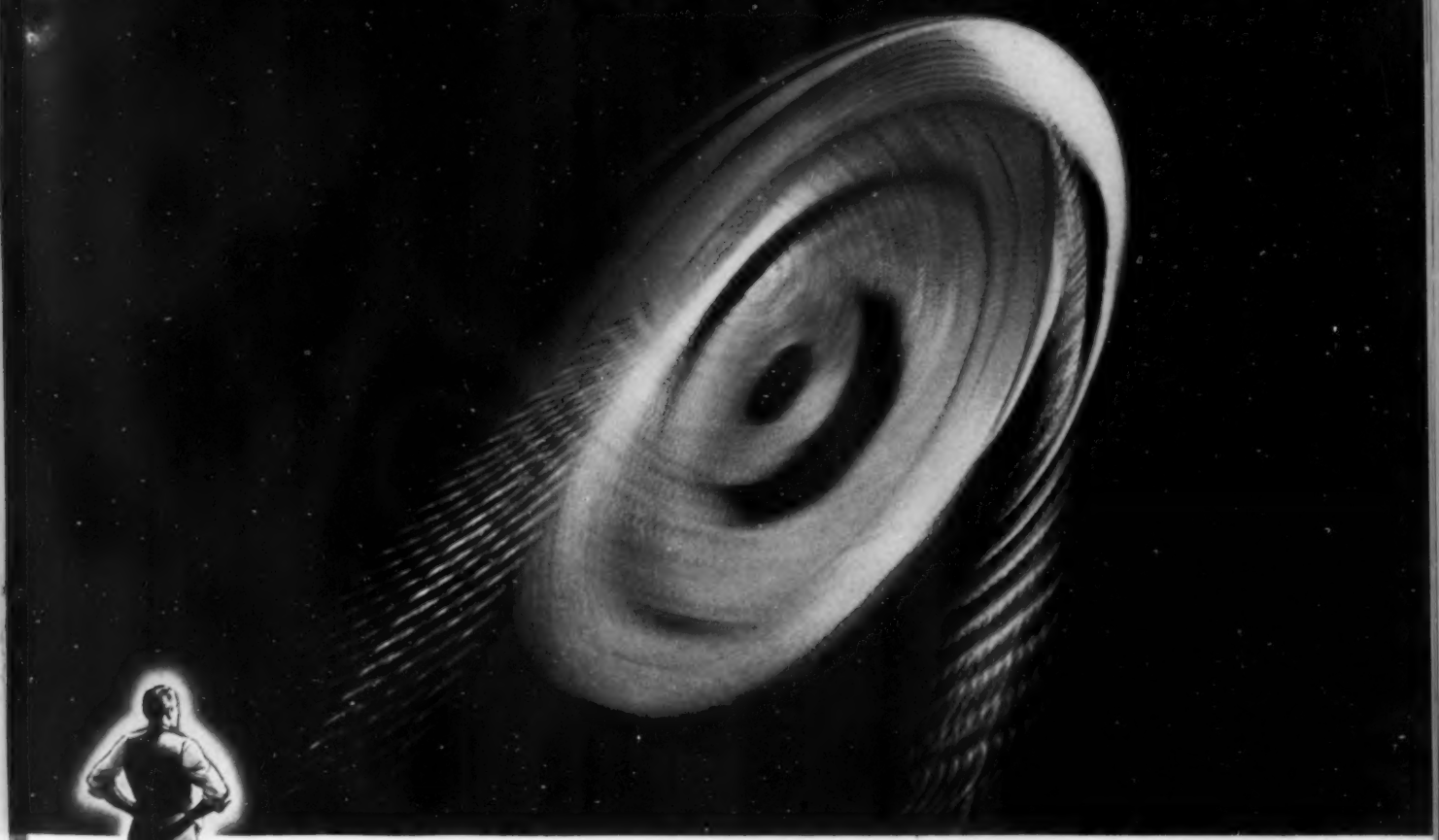
DON'T LET SHEAVES SHIMMY IF YOU WANT ROPE SAFETY!



YES, THOSE seemingly unimportant wire rope sheaves of yours—sheaves that perhaps are hidden away, out of sight—have a lot to do with the safety of your wire rope and the life you get from it!

For example, do your sheaves "shimmy"? If so, remember that's the signal for sheave misalignment—the result of abnormal bearing wear due to improper lubrication. And excessive rope wear follows.

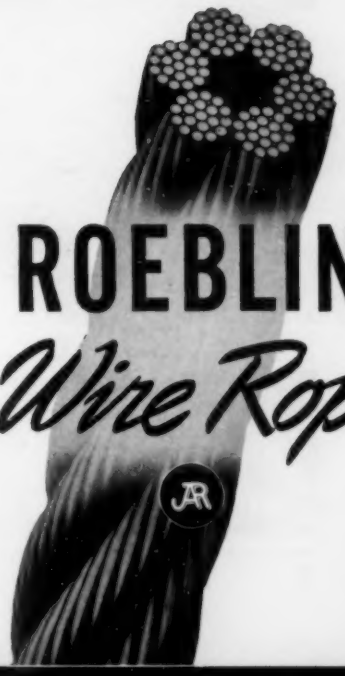
Then, too, when rope sheaves are neglected there are other dangers. Bearings may "freeze" because of improper lubrication or become jammed—and this means that flat spots will be worn in the sheaves by the rope.

Or your sheave grooves may not run true—causing rope wobble. Or the sheaves may be too small or too soft. At any rate, all of these things accelerate rope wear—reduce rope safety.

Periodical inspection and proper maintenance of wire rope sheaves pays big in wire rope service and safety! For full information regarding proper sheave maintenance practice, to meet your own individual requirements, consult the nearest Roebling Office.

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

JOHN A. ROEBLING'S SONS COMPANY
Trenton, N.J. *Branches in Principal Cities*



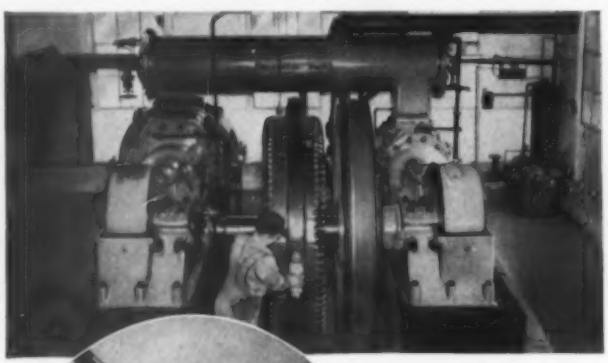
ROEBLING
Wire Rope

ROEBLING "BLUE CENTER" WIRE ROPE

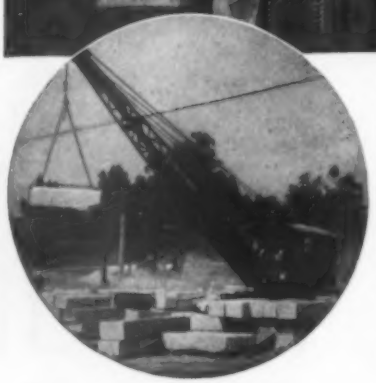
MORE COMPRESSOR HOURS

FEWER INSPECTIONS REQUIRED

GENERAL VIEW of North Carolina Granite Corporation's quarry at Mt. Airy. The quarry, approximately 75 acres in extent, with 3 cutting plants, furnishes stone for schools, churches and other structures, including the $15,000,000 Arlington Memorial Bridge. All equipment from drills to compressors, saws, and locomotive cranes is kept at top condition with Texaco Lubricants.



TWO-STAGE Ingersoll-Rand 500 h.p. compressors. The cylinders are lubricated with Texaco Ursa Oil, have been for years.



LOCOMOTIVE CRANES on North Carolina Granite's property. Texaco Crater Compound is making an enviable record giving longer life, better protection to all wire rope and gears about this quarry.

THEY'RE keeping compressors working longer hours with less time out for inspection and cleaning, at the North Carolina Granite Corporation's quarry, Mt. Airy, N. C.

In spite of this hard service, valves and ports stay free from carbon accumulations, and continue to seat properly. For more than 7 years, these compressors have been lubricated exclusively with Texaco Ursa Oil. In fact, all equipment here is Texaco lubricated 100%.

You can get similar operating efficiencies by using Texaco Alcaid, Algol, or Ursa Oils.

Experienced lubrication engineers, trained in the selection and application of Texaco Compressor Lubricants, will be glad to demonstrate that savings can be made with Texaco Perfected Lubrication.

For prompt engineering service and deliveries, phone the nearest of our 2279 warehouses in the U. S., or write:

The Texas Company, 135 E. 42nd St., N. Y. C., N. Y.

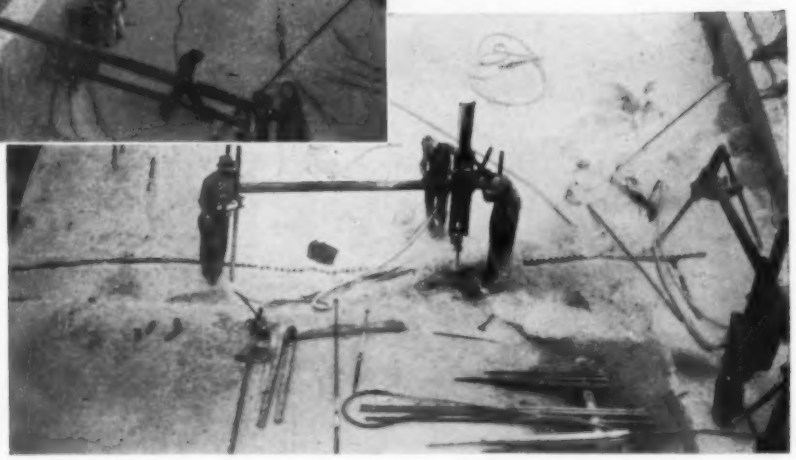
TEXACO

TEXACO

TEXACO'S INTERESTING BOOKLET on rock drills, their care and lubrication. 36 pages of valuable information. Plentifully illustrated. It's FREE.

ALCAID, ALGOL and URSA OILS

TIMKEN BITS Reduce The Cost Of Quarrying Granite Blocks



All quarrying at the Allen-Logan Granite Quarry, Elberton, Georgia, is done with TIMKEN Rock Bits.

Cutting out blocks of granite for building and monumental purposes is a job that demands accuracy as well as stamina in the drilling equipment. The operators of the Allen-Logan Granite Quarry have found that they can drill faster, straighter and get more footage of hole per bit with TIMKEN Bits. That means they can produce more blocks per day —consequently lower cost per block.

Wherever there is rock to be drilled—in quarries, mines or construction work—this modern rock-drilling tool saves time and money for its users. *You* can have these advantages *now* by getting in touch with the nearest Authorized Distributor. Write for his name and address.

Be sure and see the TIMKEN exhibit in the Metals Building at the New York World's Fair.

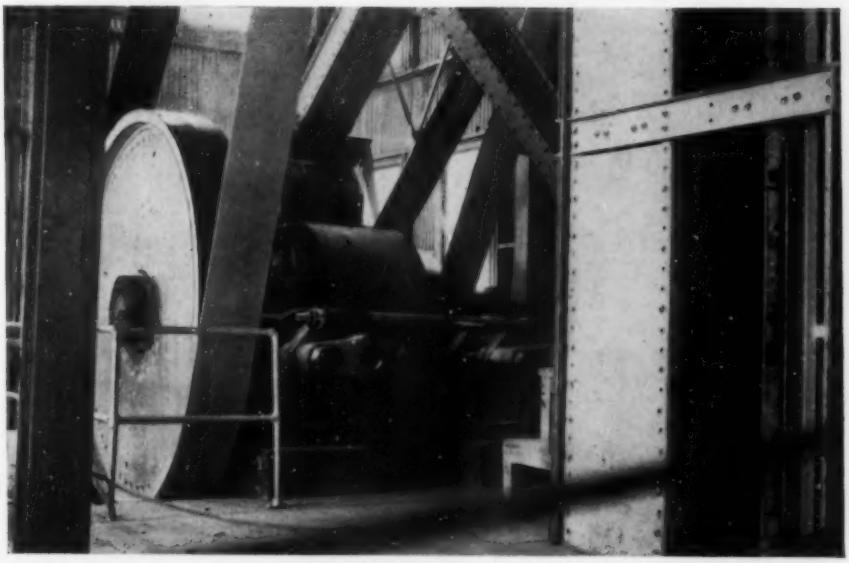
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN

ROCK BITS

AGRICULTURAL LIMESTONE

can be made a very profitable side line with



TRAYLOR CRUSHING ROLLS

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

Welded or Riveted Stacks, Tanks and Bins for any purpose.

For a great many years, in mining and numerous other industries, crushing rolls have been proven to produce fine ground material at the lowest cost per ton of any type of crushing machine, when the feed is such as can be handled by rolls.

Limestone operators can profit greatly from this fact because their otherwise nearly worthless fines are of ideal size for roll feed to produce agricultural limestone of 20-mesh fineness. Thus, with raw material at no cost, already of the right size for crushing with rolls, a considerable tonnage of by-product may be made which will sell at a handsome profit.

Traylor Crushing Rolls have been built in several types and many sizes for nearly thirty-five years and are now in daily use in practically every civilized country in the world, crushing economically most of the known varieties of rock and ore.

Installation of a Traylor Crushing Roll is not particularly expensive, and therefore limestone operators will be well repaid for investigating this source of potential extra profit.

WRITE FOR OUR BULLETIN 3627

TRAYLOR ENGINEERING & MANUFACTURING CO.

ALLENTOWN, PENNSYLVANIA, U.S.A.

NEW YORK CITY
3916 Empire State Bldg.

CHICAGO
815 One La Salle Street Bldg.

SALT LAKE CITY
101 West Second South St.

LOS ANGELES
919 Chester Williams Bldg.

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6211 22nd Ave., N. E.

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B. C. EQUIPMENT CO., LTD.
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MAQUINARIA INTERNACIONAL S. R. L.
Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F. Mexico

MANILA MACH. & SUPPLY CO., INC.
Manila and Baguio, P. I.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Oruro

GRINDING GYPSUM

85% Minus 100-Mesh at 12 Tons Per Hour

with the RAYMOND Low-Side Roller Mill

WHENEVER an important new plant is equipped or an old one modernized, the wide preference for Raymond Roller Mills is recognition of their all 'round dependability and long-term economy.

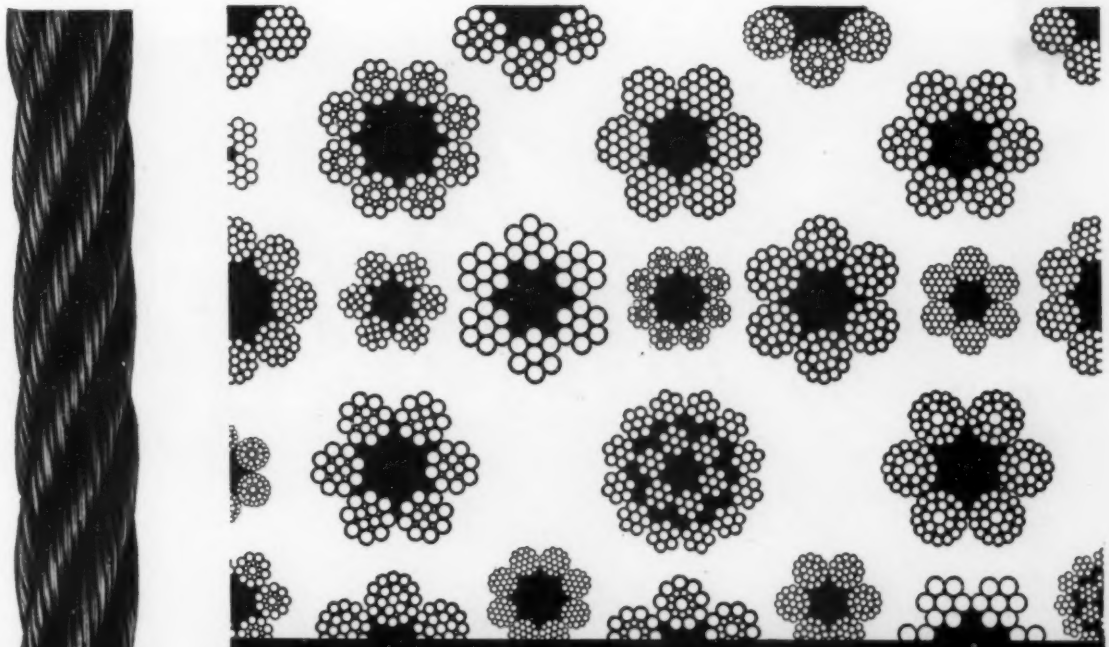
In a recent installation, two of the latest type Raymond Low-Side Roller Mills with air separation are used for pulverizing Nova Scotia gypsum rock. Each mill has its own automatic motor-driven feeder and is equipped with a cyclone collector and tubular collector to catch the fine dust. The material is handled in an enclosed system under suction. This assures dustless operation and maximum recovery of the product.

The Low-Side Roller Mills are standard equipment in the nonmetallic-minerals industry for grinding to average commercial fineness, as required in reducing phosphate rock, limestone, bauxite, clay and similar materials. Capacities up to 40 tons per hour . . . at record low power costs per ton.

Write for Catalog No. 34

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO

Sales Offices in Principal Cities
Canada: Combustion Engineering Corp., Ltd., Montreal



ALL CONSTRUCTIONS AND SIZES ARE MADE IN WISSCOLAY PREFORMED

Rope quality is important . . . but construction to meet conditions of use is likewise essential in reducing rope costs. Number of strands, relative sizes of wires, nature of core and kind of metal must be correctly combined to give you the longest possible rope life. You can get exactly the best combination for your use in Wisscolay Preformed. And as for quality . . . there is no better rope made than WICKWIRE ROPE.

WICKWIRE ROPE

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

FOR ST. LOUIS

and the INDUSTRY'S BIG CONVENTIONS AND EXPOSITIONS *at the*

HOTEL JEFFERSON

NATIONAL SAND AND GRAVEL ASSOCIATION
and the
NATIONAL READY MIXED CONCRETE ASSOCIATION

January 17, 18 and 19, 1940

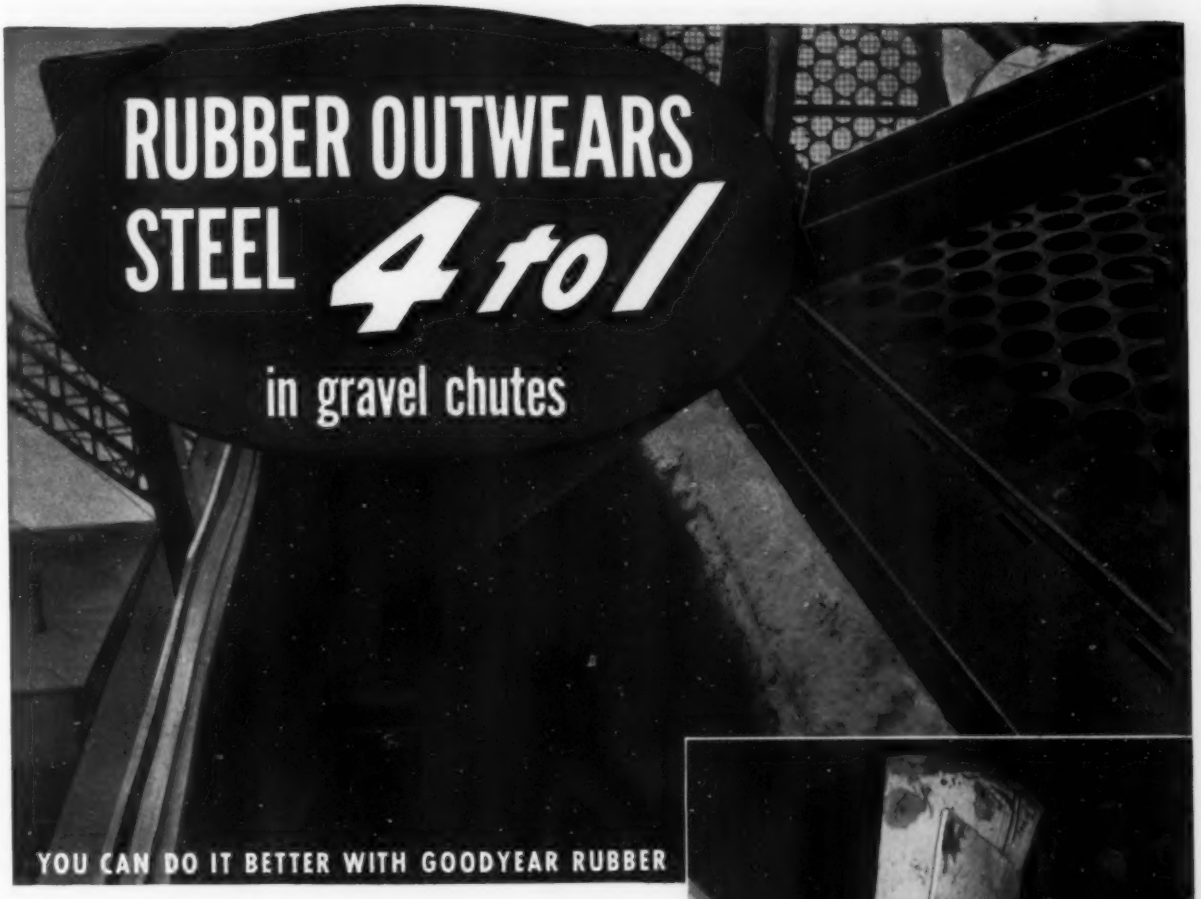
◆ ◆ ◆

NATIONAL CRUSHED STONE ASSOCIATION

January 22, 23 and 24, 1940

All producers, irrespective of Association membership, are invited to attend, to participate in the proceedings, and take advantage of the educational features which the programs and the expositions afford. Don't miss the round-table discussions of the industry's problems.

Everyone Invited
Be there! Everybody Else Will!



PLACE: A large Pennsylvania sand and gravel plant.

PROBLEM: Too rapid wear of steel chutes used to carry sand and gravel up to 2½" size from screens to storage bins.

SOLUTION: When lined with ½" Goodyear rubber chute lining on specification by the G.T.M.—Goodyear Technical Man—*four times longer* service was obtained than from unlined chutes of high-grade ¾" steel!

REASON: Goodyear chute lining is an extremely tough rubber sheet material specially developed by Goodyear for protection of all surfaces exposed to constant abrasion. Its resiliency enables it to withstand pounding wear far longer than rigid metals.

CONCLUSION: On any operation where abrasion is a problem—conveyor belts, air hose, chutes — let the G.T.M. show you how *you can do it better with Goodyear rubber!* To bring him to your plant write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

Centennial of Charles Goodyear's discovery of vulcanization

THE GREATEST NAME IN RUBBER

GOODYEAR

The Issue With Triple Value For Advertisers

The January issue is always used extensively as a buying reference but its use will be increased threefold this year. Buyers will use it as never before in seeking information on sources of supply for the machinery, equipment and supplies they must have because it will

(1) **Review the new developments, new processing and new machinery and equipment of 1939.**

(2) **Forecast trends for 1940.**

(3) **Serve as the pre-convention number for the industry's annual conventions and the Road Show. Advertisers will benefit from this added interest and from the extra distribution provided. A special insert section will be available too.**

Regular space rates apply. No extra charge for the special printing and additional distribution.

Now is the time to plan for it. The first step is to reserve your space or write for further information to:

ROCK PRODUCTS

205 W. WACKER DRIVE
CHICAGO, ILL.

Before installing DUST or FLY ASH Collectors

What such companies as those listed here have done it will pay *you* to do. More than 1100 companies today are using Buell's Van Tongeren system for dust collection or fly ash correction. Reorders regularly follow as new needs arise.

Buell Collectors combine the low-cost, trouble-free service of the cyclone with the high over-all efficiency of the patented Van Tongeren design. Investigate, and you will find that Buell Collectors give you the maximum return on your investment.

INVESTIGATE BUELL AND *save money!*

FOR INFORMATION on dust collection ask us for *Bulletin D81;* on fly ash, for *Booklet A93.* Either, or both of these will be sent free to any managing executive or operating engineer.

BUELL ENGINEERING COMPANY INC
SUITE 5000, 2 CEDAR STREET, NEW YORK

Wherever you are located you will be quickly served through sales offices of either BUELL ENGINEERING CO. or B. F. STURTEVANT CO.

SOME RECENT BUELL INSTALLATIONS

FORD MOTOR COMPANY
DEARBORN · MICH
Reorder 10 months later

KOSMOS PORTLAND CEMENT COMPANY
KOSMOSDALE · KY

DOW CHEMICAL COMPANY
MIDLAND · MICH

WISCONSIN ELECTRIC POWER COMPANY
MILWAUKEE · WIS
Reorder 18 months later

INTERNATIONAL PAPER COMPANY
NEW YORK · N Y

MEDUSA PORTLAND CEMENT COMPANY
WAMPUM · PA
9 months later: reorder for
YORK · PA

THE DETROIT EDISON COMPANY
DETROIT · MICH

CONGOLEUM-NAIRN INC
KEARNY · N J

NEW YORK STATE ELECTRIC & GAS CO
DRESDEN · N Y

REGAL LAUNDRY INC
BALTIMORE · MD

AMERICAN POTASH & CHEMICAL CO
TRONA · CAL
Reorder 1 month later

LEHIGH PORTLAND CEMENT COMPANY
UNION BRIDGE · MD

buell
DUST COLLECTORS

OVER THERE—War lords parley, swap strategy, draft battlefield blueprints, engineer devices to destroy humanity! **OVER HERE—American Road Builders prepare to meet at the Road Show-Convention to seek new ideas, to share methods, to solve problems, to plan better and safer roads for the enjoyment and advancement of mankind.**

OVER THERE—Factory wheels turn faster, workers produce instruments of death and disability, engines of destruction make their debut behind the trenches! **OVER HERE—Manufacturers of road-building materials and machinery also operate at top speed, make ready new products for preview in Chicago—equipment to build tomorrow's roads.**

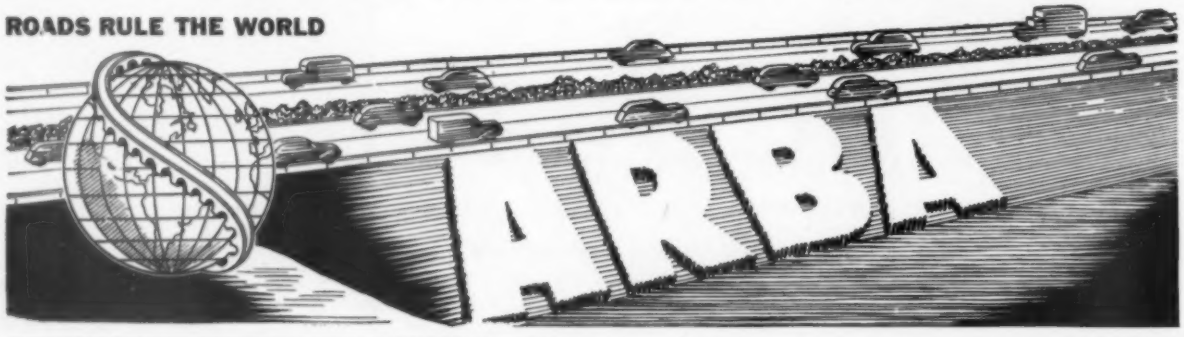
OVER THERE—Selfish leaders dictate action to bring about wholesale slaughter and the doom of progress! **OVER HERE—Highway planners, designers, administrators and builders will hear Federal Works Administrator John M. Carmody, Senator Carl Hayden of Arizona, Congressman Wilburn Cartwright of Oklahoma and Public Roads Commissioner Thomas H. MacDonald in up-to-the-minute talks about construction for peace, prosperity and progress.**

1940 ROAD SHOW - CONVENTION • CHICAGO

INTERNATIONAL AMPHITHEATER JANUARY 29—FEBRUARY 2

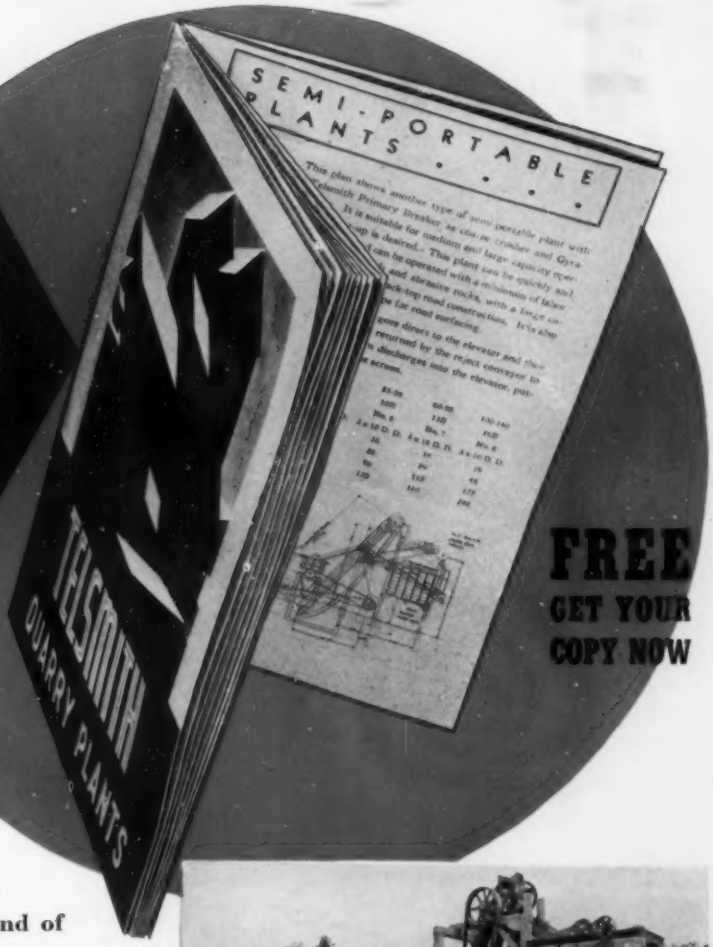
AMERICAN ROAD BUILDERS' ASSOCIATION

ROADS RULE THE WORLD



New 1940 Edition

HANDBOOK OF PLANT LAYOUT



FREE
GET YOUR COPY NOW

● There is always *something new* in plant layout! Important changes in road building and construction requirements mean new specifications . . . new methods. And of course, new equipment . . . improved plant design to meet these trends . . . modernization that makes money. These are all things you want to KNOW about.

Here's *the* book that tells you. Not a machinery catalog—not at all. A complete collection of quarry plant layouts of every type. From the simplest one-crusher set-up to the elaborate three-crusher outfits—stationary, portable, semi-portable. Practical, understandable diagrams, without any unnecessary high-hat engineering gingerbread.

How can you get extra capacity? extreme flexibility? a particular size or sizes? advantages of permanency with portability? ability to handle tough, abrasive rock? Get the answers to *all* such questions in brief, accurate, fact-and-figure form.

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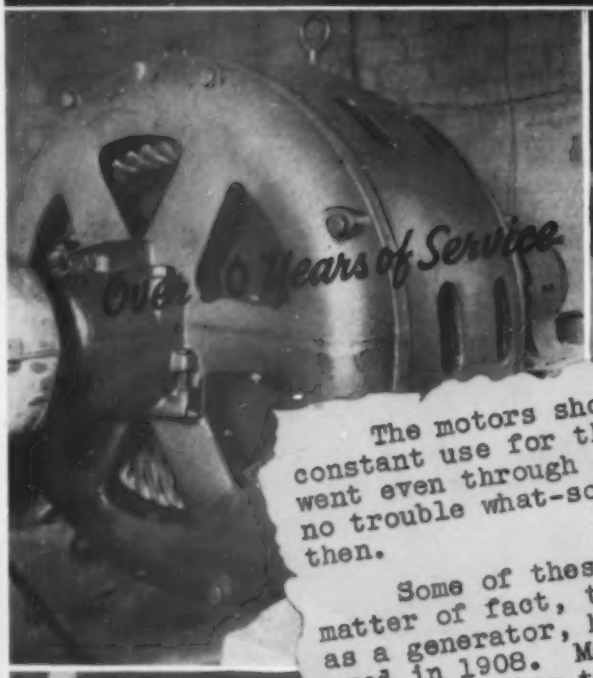
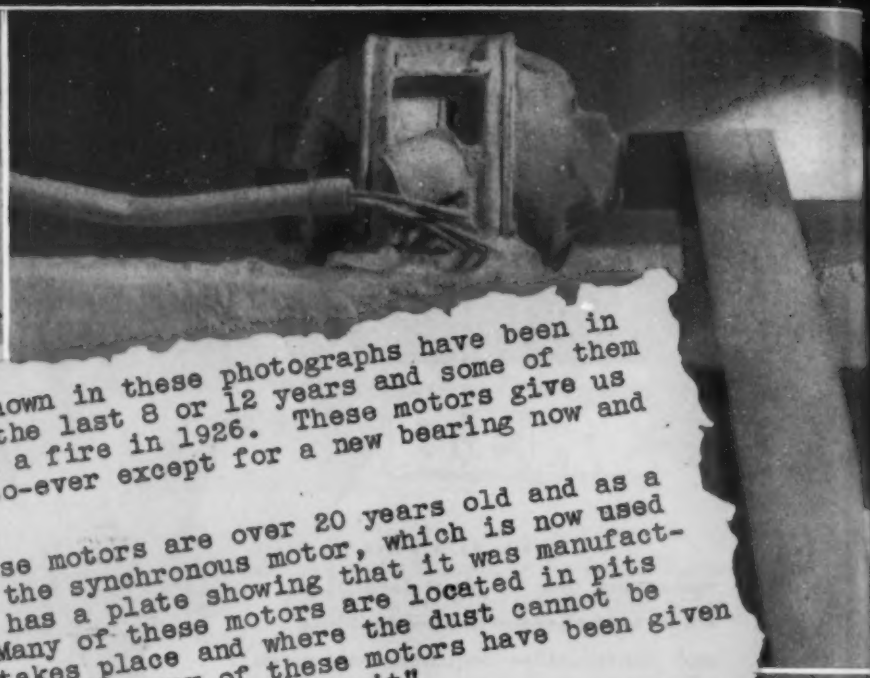
TELSMITH *Quarry Plants*

Marble Dust! Fire! Time!





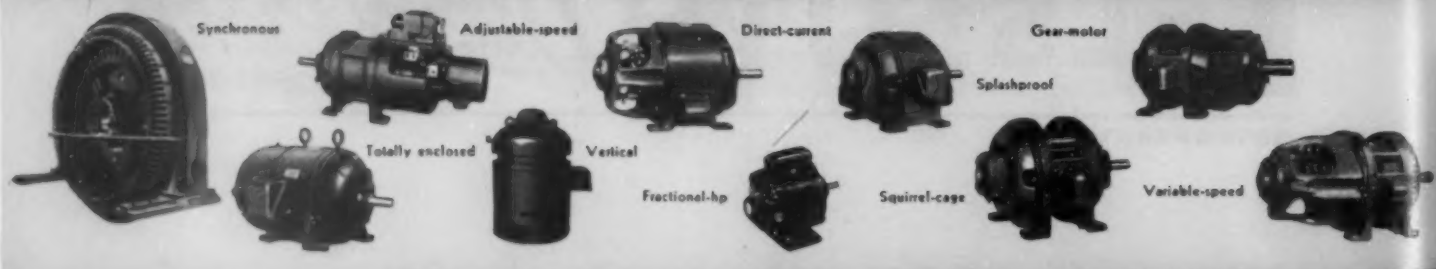
The motors shown in these photographs have been in constant use for the last 8 or 12 years and some of them went even through a fire in 1926. These motors give us no trouble what-so-ever except for a new bearing now and then.

Some of these motors are over 20 years old and as a matter of fact, the synchronous motor, which is now used as a generator, has a plate showing that it was manufactured in 1908. Many of these motors are located in pits where grinding takes place and where the dust cannot be controlled. The abuse many of these motors have been given has proven to us that they can "take it"

UNIVERSAL MARBLE PRODUCTS CORP.

By Frank F. Palmason
Executive Director

THERE'S A G-E MOTOR TO FIT ANY JOB



-Test G-E MOTORS

At Universal Marble Products Corp.

Read What Mr. Palmison Says About How They Passed These Tests

THE statement on the opposite page from Mr. Palmison, Executive Director of the Universal Marble Products Corp. at Thornwood, N. Y., tells how G-E motors have been tested by marble dust, fire, and time. In spite of these severe conditions, the G-E motors have cost practically nothing for upkeep.

The dust alone is a severe test of motor insulation. Powdered dolomite and marble dust, products of this plant, are very abrasive. Totally enclosed motors would usually be recommended for such locations.

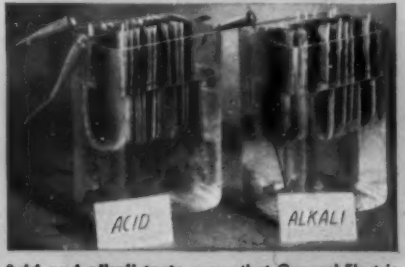
Open G-E motors, however, have not only stood up under the dust, but have passed through a fire, and have already turned in long operating records. They have, as Mr. Palmison says, given "no trouble whatsoever except for a new bearing now and then."

Why Is Such Performance Possible?

One reason G-E motors pass performance tests like this is the thorough testing at every point in their manufacture. Designs, materials, and the motors—both finished and in process—are all continually checked by numerous tests such as those shown below.

G-E motors are available in all sizes and types. When you need information on any type, call the nearest office of General Electric, the G-E Supply Corp., or G-E motor dealer. General Electric, Schenectady, New York.

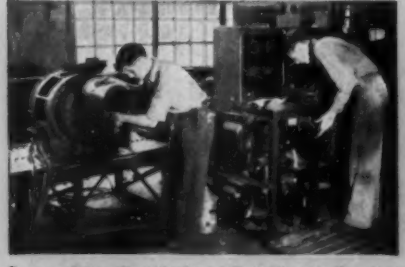
TYPICAL FACTORY TESTS ON G-E MOTORS



Acid and alkali tests prove that General Electric insulating varnish protects motor windings against mild corrosive agents

Abrasion test. This machine tests the resistance to abrasion of the enamel film on magnet wire used in G-E motors

High-potential test No. 1 checks the stator windings of G-E motors before they are dipped in the insulating varnish



A complete electrical test is made on all motors before they leave production, even though they have already passed many tests

High-potential test No. 2 is likewise made on each motor to prove the dielectric strength of the insulation

Punishing life tests on representative G-E motors include service more severe than any conditions motors normally meet

GENERAL ELECTRIC

Fine Sizes Now Made With a
SHORT HEAD CONE

Behind and to the left of the three-foot Short Head can be seen a portion of the three-foot Standard Symons Cone.

Again, the Short Head Cone fills the need for increased demand of finely crushed materials. When the Hopkinsville Stone Company of Hopkinsville, Kentucky, placed its first Cone in service in 1931, a three-foot Standard Crusher met the then existing need for finer sizes. But, as with so many producers, changing conditions required more and more fine material which the earlier installation could not produce economically. The solution to the problem was the installation of a Short Head to follow the Standard, just as many other producers have done under similar conditions.

Producing finer sizes in sufficient quantities when required, and at a cost which will return a greater profit, is the reason why the more progressive companies have turned to the combination of Symons Standard and Short Head Cones. If your demand for fine sizes is increasing, it will pay you to investigate how the Short Head Cone will lower your crushing costs.

NORDBERG MFG. CO.
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TORONTO Concourse Bldg.
LONDON Bush House

SYMONS CONE CRUSHERS

IF YOU'RE LOOKING FOR TRUCK FEATURES . . .

Look at the FORD!

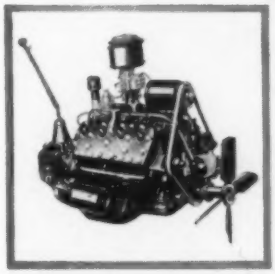
● When the Ford Motor Company speaks of truck features, it doesn't mean "gadgets." Ford features are outstanding qualities incorporated in the Ford Truck to make it tougher, more rugged, more dependable, more economical — or to make the unit easier to handle and operate, increase the driver's comfort, give added protection to the load and contribute to safety.

Shown here are a few important Ford features for 1940. There are many more which you're invited to see at your Ford dealer's. Make a note of them. Compare them with the features offered in other trucks of about the same price — or any price. Arrange for an "on-the-job" test and see what these features mean in performance and economy before you spend another truck dollar.

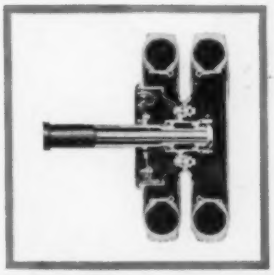
AMONG THE FORD FEATURES FOR 1940

6 wheelbases, 42 body and chassis types. New Sealed-Beam Headlamps. New, larger battery —more powerful generator. Battery Condition Indicator. Worm-and-roller steering. Straddle-mounted driving pinion — ring gear thrust plate. Needle-roller bearing universal joints. Factory-installed two-speed rear axle (at extra cost). Ford Engine and Parts Exchange Plan.

FORD MOTOR COMPANY, BUILDERS OF FORD V-8 AND MERCURY CARS, FORD TRUCKS, COMMERCIAL CARS, STATION WAGONS AND TRANSIT BUSES

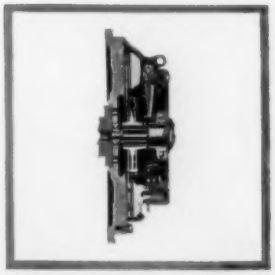


3 V-8 engines. 95, 85 and 60 hp. The only V-type, eight-cylinder truck engines on the market today.



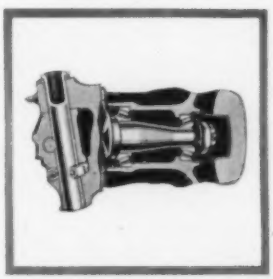
Full-floating rear axle. Relieves the axle shafts of all load stresses. Minimizes possibility of shaft failure.

Big hydraulic brakes. Unusually large brake lining area. Dependable, built to Ford standards of safety.

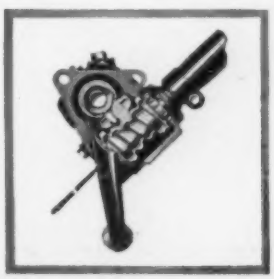


Semi-centrifugal clutch. Provides high power-transmitting capacity combined with low pedal pressure.

New front springs. Provide an additional point of support for frame side-members.



Rugged spindle bolt. Sturdy design for extra reliability. Spindle bolt has 1¼-in. diameter.



Worm and roller steering. Minimizes friction and greatly increases the ease of handling.

FORD V·8 TRUCKS

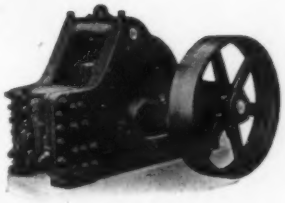
Regulars—One-Tonners—

¾-Tonners—

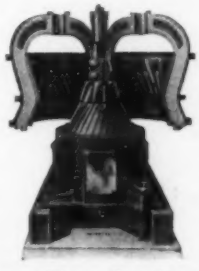
Cab-Over-Engine

STURTEVANT

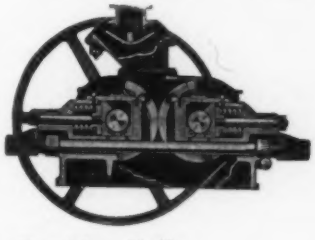
Crushing, Grinding
Pulverizing, Granulating
Separating (Screen and Air)
Mixing, Acidulating,
Elevating and Conveying
Machinery
Engineers—Operators



Jaw Crushers
for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



Rotary Fine Crushers
for intermediate and fine reduction. (1″ to 1/4″.) Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers. Many sizes. Belt or Motor driven.



Crushing Rolls
for granulation, coarse or fine, hard or soft materials. Precision and automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8x5 to 38x20. Roller or Plain bearings. The standard for abrasives.

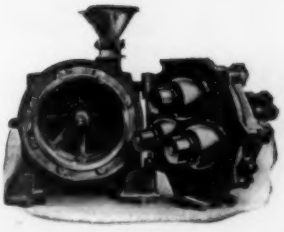
AIR SEPARATORS

for finest separation of dry materials. Range of work 50-350 mesh. Capacities 1/4 ton to 50 tons per hour. Large feed opening, steep cones, rigid construction, Ball and Roller bearings. Small power, low upkeep, easy adjustments. Sizes: 3′ to 16′.

259

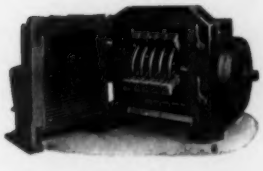
Air Separators

Sold for cement alone. All on approval — none rejected. Hundreds used for Limestone, Lime, Hydrate, Gypsum, Clay, Refractories, Talc, Soapstone, Coal, Coke, Phosphates, Abrasives, etc., etc.



Ring-Roll Mills
for medium and fine reduction (10 to 200 mesh) hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes, large or small capacities. No scrapers, plows, pushers, or shields.

Moto-Vibro Screens
screen anything screenable. Classified vibrations. Unit construction — any capacity. Open door accessibility. Open and closed models with or without feeders. Many types and sizes — range of work 1/2″ to 60 mesh.



Swing-Sledge Mills
for coarse and medium reduction. (1″ to 20 mesh.) Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.

STURTEVANT MILL CO. HARRISON SQUARE **BOSTON, MASS.**

NEW LOW-COST TYPE "R" CRUSHER HANDLES HARD, CLEAN, FRIABLE CALIFORNIA GRAVEL AT 37.5 TONS PER HOUR!

Here's an Operating Report You'll Be Interested In! Read Why Allis-Chalmers Type "R" Gyratory Crusher Gives You High Capacities ... a Better Product at Low Cost!

It's one thing for a manufacturer to make claims for a new machine. But it's another when those claims are backed up by actual results under operating conditions in the field!

We think the new Type "R" Gyratory Crusher, announced last month, is the biggest development that ever hit the fine reduction field.

But don't take our word for it!

Check the operating report shown here ... the results during seven days of field operation!

The 322 Crusher handled 37.5 tons per hour of hard, clean, friable California gravel containing a considerable percentage of granite ... with an average power input of 19 hp ... and look at that screen analysis of the final product!

Here's why Allis-Chalmers' most recent contribution to rock and ore reduction has such an amazing capacity ... delivers a better product at lower cost!

Correct coordination of speed, design of crusher chamber and head movement gives you continuous high capacity under crusher-buried feed. One-piece, self-tightening concave ring permits finer setting ... assures you a more uniform product.

Adjustment of discharge opening is easy ... almost instantaneous ... with the oil-filled hydraulic jack. Hydraulic step support allows the crusher to relieve packing even under great strain. The automatic relief valve passes tramp iron fast ... cuts your outage time!

And, to top it off ... Allis-Chalmers Type "R" Gyratory Crusher No. 322 costs less than any comparable machine on the market today!

Find out how you can get started on these big savings now! Bulletin B6006 gives complete information about Allis-Chalmers Type "R" Reduction Crushers. Write for your copy ... today!

322 TYPE "R" CRUSHER TEST REPORT*

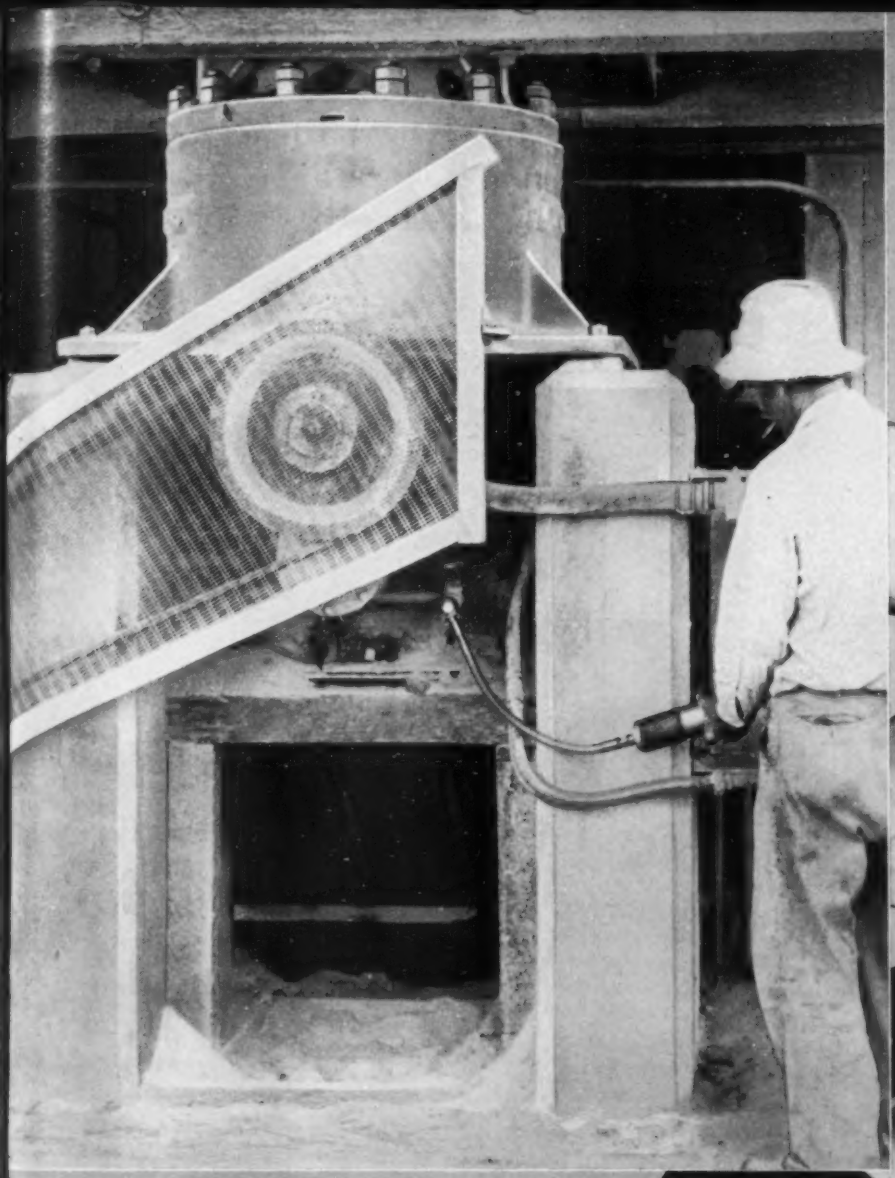
Average % Passing Square Openings						
Opening size	1.05"	.742"	.525"	.371"	.185"	.065"
% Passed	100	93.8	65.1	45.9	25.7	13.7

Date of test—March 6-14, 1939
Material—Hard, clean, friable California gravel with high % granite
Feed—Minus 2-½" plus 1"
Average Power Input—19 hp
Capacity—37.5 tons per hour

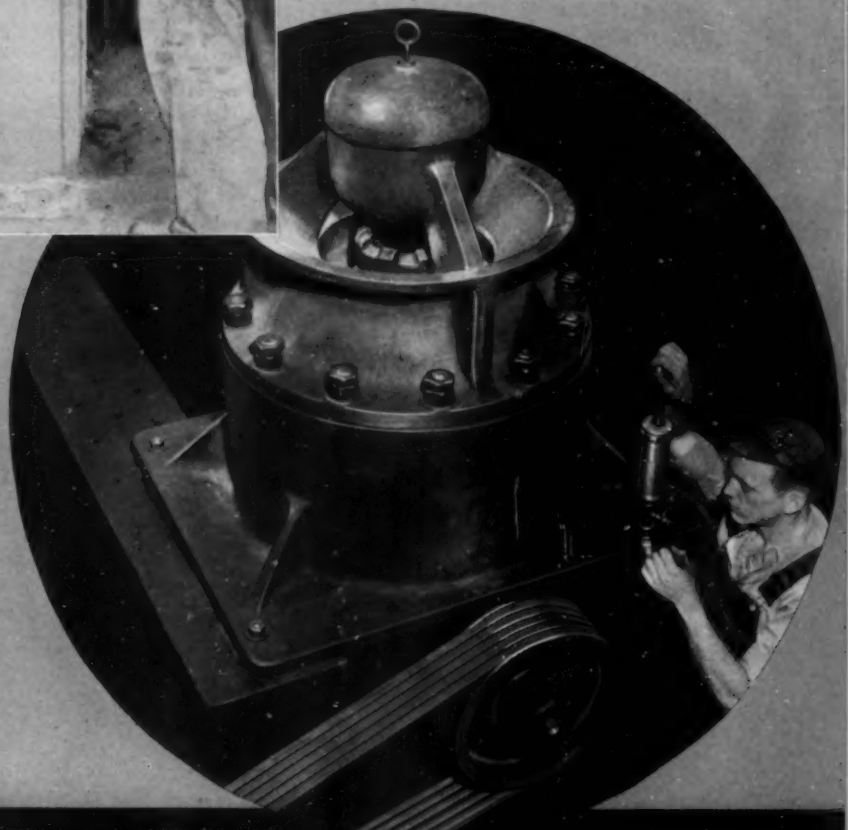
* Customer's name supplied on request

A-1163

A-C



INCREASED SAFETY ... fewer shutdowns with the automatic relief valve. If the tramp iron is too large to be passed, opening the oil drain relieves all pressure ... and the piece may be picked out by hand.



COMPACT, EASY TO INSTALL, 322 Type "R" Crushers are shipped completely assembled. A liberal supply in stock guarantees fast delivery. Pre-testing eliminates experimentation after installation.

AS RELIABLE AS HYDRAULIC brakes on a car ... even in the hands of inexperienced operators ... the oil-filled hydraulic jack gives you any size within the range of the crusher, fast ... positive.

Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

CRUSHING, CEMENT AND MINING DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

TAKE A TIP FROM THE ARMY

FOR MODERN SPEED IN HAULING!

Today the U. S. army is *modern*—it is motorized AND mechanized. Governments have built thousands of miles of highways to facilitate the movement of *motorized* units to the scene of battle. They have spent millions of dollars to *mechanize* with tanks and armored cars for the actual fighting on the battlefields where no highways exist.

Take a tip from the army: Motorize with trucks where you have a pavement or its equivalent—a smooth road. Mechanize with ATHEY FORGED-TRAK TRAILERS where there is no highway . . . where you need to maintain consistent speed through mud, rock, sand, snow, and ice. For Athey Forged-Trak Trailers give you consistent, profitable hauling speed OFF THE PAVEMENT . . . where motor trucks would be helplessly mired . . . where rubber-tired wheels would slip on clay . . . spin on ice . . . dig deep ruts in mud or be damaged on rock.

Its profitable—to mechanize with Athey Forged-Trak Trailers, pulled by "Caterpillar" Diesel Tractors. Get the whole story from your "Caterpillar" dealer or write us direct:

ATHEY TRUSS WHEEL CO., 5631 W. 65th St., CHICAGO, Ill.
Cable Address: "TRUSSWHEEL" Chicago

FLASH!

Many of the Contractors working on the Pennsylvania Turnpike Highway have mechanized their jobs with Athey Forged-Trak Trailers and "Caterpillar" Diesel Tractors.

MECHANIZE TO KEEP THE LOADER SWINGING

TO PREVENT— "Pile ups" of hauling equipment stopped by mud, rock, sand, or slippery going.

TO PREVENT— "Partial Loads" in an effort to nurse Motorized Equipment "to work."

TO INSURE— Uninterrupted hauling cycles allowing maximum loader output.

The broad, flat tracks of Athey Forged-Trak units stay on top of the mud—provide a roadway over rock—over snow and ice—over slippery clay. It's a firm roadway for your big, heavy loads—a "steel highway" that brings consistent speed regardless of bad going.

MECHANIZE WITH ATHEY FORGED-TRAK TRAILERS

Labor—and the Government

THE National Labor Relations Board has so lost caste that it is being kicked about now even by the C. I. O.—or at least by John L. Lewis. He had been about its last defender. His motives are not easy to fathom. Apparently the Board has been so one-sided that its usefulness is over, even to those who have benefitted from its bias.

Probably also it is beginning to dawn on labor leaders that if the government is to deprive employers of all their freedom of action it must inevitably result in depriving labor of its freedom of action also.

Here are some of the "inequalities" in the Act and its administration listed by John C. Gall, counsel for the National Association of Manufacturers in a statement to the Committee on Education and Labor of the United States Senate:

(1) A labor union *may* spread false tales about an employer and his policies as to wages, hours and working conditions in an effort to unionize his employes. The employer *may not* give his honest opinion about the merits of a labor organization.

(2) A union can secure an election upon petition to the National Labor Relations Board. An employer's petition is utterly disregarded.

(3) A union *may demand* that all employes of a plant be union members, and may call a strike to enforce the demand. An employer *may not* demand or even contract that any employe shall not be a union member.

(4) A labor organization *may strike* without making any offer to bargain. An employer *may not* engage in a lockout without accepting an offer to bargain, or as a defensive measure against a strike where the demand has been made for collective bargaining.

(5) A union *may advise* workers that they are required to join a union, such advice being *untrue*. An employer *may not* advise workers that they need not join a union in order to hold their jobs, such advice being *true*.

(6) A union *may* make exaggerated or even *untrue* statements to workers with respect to the company for which they work, in order to persuade them to strike. An employer *may not* make an exaggerated statement to union representatives during the course of collective bargaining negotiations.

(7) A union *may* bargain collectively through whatever representatives it may, in its uncontrolled discretion, select. An employer *may not* bargain through whatever representatives he may select.

(8) A union *may encourage and induce* men to strike by promising strike benefits, and may pay such benefits. An employer *may not discourage* a strike by promising employes a bonus if they will refrain from striking.

(9) A union *may* call its members out on strike, even in the absence of any grievance against the particular employer. An employer *may not* discharge those employes who are fomenting a strike.

(10) A union *can strike* in the absence of any unfair labor practice by the employer. The employer *may not*, without grave risk, fill the places of strikers who have struck without any unfair labor practice on his part.

(11) A union *may require* an employer to give its members protection from non-union workers. An employer *may not secure police protection* for non-union men against union workers.

(12) A union may put on a vigorous campaign for a closed shop, and tell employes it is going to secure one—*that if they don't join they'll be out of jobs* as soon as the closed shop arrangement is made. The employer may not *advise* employes that he will not agree to a closed shop.

(13) A union *may discriminate* in any manner it sees fit against applicants for union membership, against its own members, or in expelling members. An employer not only *may not discharge* or refuse to employ a man because he is a union member, but he may not take any kind of action, disciplinary or otherwise against any employe, which may be held to be a discrimination "because of union activity."

Mr. Gall has cited various cases and decisions to prove his contentions. He has done an admirable job of stating the case and constant repetititon can not fail to result either in changing the law or changing the personnel of the National Labor Relations Board, or both.

The intent of the law was to prevent interference with the right of labor to organize and bargain collectively. We all know that a certain type of employer had not permitted employes to organize, which is their incontestable right. In order to "crack down" on him and his kind, all rights, even that of free speech guaranteed by the Constitution, have been taken away from *all* employers. It is not strange that even labor leaders see the harm that results whether or not they are impressed with the injustices.

Nathan C. Rockwood

LETTER TO THE EDITOR

Clinker Heat Recovery

SIR: The article in your September issue, "New Clinker Cooler Improves Product," p. 40, tells us that in handling 1750 bbl. of clinker per day and employing 16,300 c.f.m. of cooling air on the first stage of the cooler, this air is preheated to a final temperature of 970 deg. F. before entering the kiln. We are also told that the initial volume of air exhausted to the atmosphere from the second stage of the cooler is 9300 c.f.m. at a temperature of 350 deg. And with an initial clinker temperature of 2400 deg., this results in a final temperature of 350 deg.

If those figures are correct my calculations show that much more heat is being recovered from the clinker than the clinker can possibly give up.

A. W. CATLIN

Chicago, Ill.
Sept. 18, 1939

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We have not reproduced the correspondent's calculations because they are based on a false premise, although we will have to admit that the paragraph referred to contains a misstatement and some of the rest of it is not as clearly and accurately worded as it should have been. That part reads as follows: ". . . . while about 16,300 c.f.m. (of air) was put through the cooler-quencher and preheated to about 970 deg. F. before entering the kiln. About 9300 c.f.m. of air was put through the secondary part of the cooler and exhausted to the atmosphere at about 350 deg. This represents about 61,000 B.t.u. per min. or about 4½ lb. of coal of the grade used."

The first statement in the above quotation is erroneous, for 16,300 c.f.m. is the *total* amount of air put through the cooler, or rather the total capacity of the fan which blows the air through. Consequently not all the air was heated to 970 deg., but only that which went through the primary part of the cooler, 16,300 — 9300 = 7000 c.f.m. The 9300 c.f.m. that went out the waste stack via the secondary part of the cooler at 350 deg. carried with it an alleged 61,000 B.t.u. which were the equivalent of 4½ lb. of coal.

Our correspondent's calculation shows that 9300 c.f.m. of air could not absorb more than two-thirds of 61,000 B.t.u. in rising from 80 deg. (kiln room temperature) to 350 deg. Our own check shows he is right. Consequently the error in B.t.u.'s lost is probably accounted for by the heat carried out with the clinker as well as with the wasted hot air.

The figures given in the article itself were rough estimates, it now appears. Actual operating test results were as follows:

The total amount of air put through the cooler (measured volume at 70 deg. F.) was 14,800 c.f.m. Of this quantity 9000 c.f.m. went to the kiln preheated for use as secondary combustion air, and the balance, 5800 c.f.m., was discharged to the atmosphere. The actual measured temperatures of the air to the kiln averaged 973 deg. F. and of the air discharged to atmosphere 340 deg. F. These were obtained as average figures for a test run with hourly readings.

Thus the actual heat recovery was more than could be computed from the figures given in the corrected paragraph, since in that case 7000 c.f.m. would be preheated from 70 deg. to 970 deg., while actually 9000 c.f.m. was preheated from 70 deg. to 973 deg. Also, of course, lowering the volume of air discharged to the atmosphere from the 9300 c.f.m. at 350 deg., given in the article to the corrected figure obtained by later tests, 5800 c.f.m., at 340 deg. would reduce the loss in wasted hot air, although the total loss in both air and clinker might have remained the same.

Those who are interested can readily determine the methods and mathematics of computing recoverable heat from clinker by referring to ROCK PRODUCTS, April 25, 1931, Part XVII of Dr. Geoffrey Martin's series of articles on "Researches on the Rotary Kiln in Cement Manufacture." This series has since been republished in book form.

We are much obliged to our correspondent for calling attention to the discrepancies in the article and the opportunity to correct them.

THE EDITOR

COMMENTS ON THE NEWS

Steel Stimulates Limestone Industry

LIMESTONE QUARRIES in the East are experiencing a very active demand for flux stone from the steel industry which is now operating almost to full capacity. The building industry also is continuing operations at a high level, and the demand for lime and aggregates of all kinds has been heavy. In the Shenandoah Valley of Virginia, the Baltimore & Ohio Railroad has been handling up to 245 carloads of lime and stone and 10 carloads of sand per day, and it is anticipated that shipments will be heavier as lime companies are putting on night shifts. Lime kilns that had not been used for 20 years have been placed in service at Stephens City.

Many Ways to Skin the Cat

WHEN RIVER PRODUCERS of sand and gravel acquired waterfront properties to unload and distribute their products, they probably didn't contemplate the use of their handling facilities for grain and sugar. Yet, according to newspaper reports from Tennessee, the development of river traffic to the point of handling a barge load of grain from St. Louis to Chattanooga and a barge load of sugar from New Orleans to Clarksville has meant the use of unloading derricks at the Dixie Sand and Gravel Co. plant in the first case, and the Cumberland River Sand Co. in the other. Maybe the sand and gravel companies will be able in this way to recover some of the profit lost by not selling their product.

Super Roads for 1960

FIFTY BILLION DOLLARS for superhighways to serve 40,000,000 cars and trucks in 1960 is the prediction of Paul G. Hoffman, president of Studebaker Corporation. A few years ago these figures would seem almost astronomical, but billions are being bandied about rather freely these days without a great deal of comment and this prediction no longer appears to be out of the realm of possibility.

Mr. Hoffman in his recent talk before the convention of the American Institute of Steel Construction said that $25,000,000,000 will be required to provide the 24,000 miles of superhighways which will be needed outside cities, and at least a similar sum will be needed to make a good start toward modernizing street facilities within cities, a job which will take at least twenty years. These improvements will be necessary, Mr. Hoffman stated, because instead of 250,000,000,000 vehicles miles yearly from 30,000,000 cars and trucks, the total in 1960 will be 500,000,000,000 miles for 40,000,000 vehicles.

Diesels Lower Trucking Cost

Inspection and maintenance practices based on periodic analyses of engine crankcase oil

By BROR NORDBERG

One of six of the newer type trucks powered with Diesel engines

SYSTEMATIC inspection followed by proper servicing, and a scheduled program for general upkeep are factors contributing toward the efficiency and economy of the Diesel-powered truck fleet operated by Consolidated Rock Products Co., Los Angeles, Calif.

This company, one of the largest fleet owners in Los Angeles, has had sufficient experience with Diesel-powered trucks to form a definite opinion as to their efficiency. After two years' operation of these units, the company's cost records disclose a substantial economy, considering general upkeep, maintenance and major overhauling along with fuel costs and mileage, as compared with gasoline-powered trucks formerly used.

In any discussion of comparative economy, consideration must be given to the condition of the equipment displaced, traffic, climate, topography, length of haul, expected life, and the types of service for which the trucks are used.

Conditions of Operation

Consolidated Rock Products Co. is now operating six producing rock, sand and gravel plants serving the Los Angeles marketing area, a number of bunkers scattered around the city and suburbs, and a fleet of ready-mixed concrete trucks. Trucking is the only practical way to transport materials from the widely-scattered producing plants, some of which is delivered directly to destination, and the balance to the various bunkers where the aggregates are stocked for re-handling by truck within a limited radius. Producing plants are in the San Fernando and San Gabriel valleys, some 20 miles from the heart of the city and the Alameda street plant, where the company has its general office and main repair shops.

Until two years ago gasoline-powered trucks were used exclusively, but after studying the experiences of other large fleet owners who had used Diesels successfully for long distance haulage, some Diesel engines were substituted. The first ones were followed progressively by others until now there are 76 Diesel-powered trucks in daily service out of a total fleet of 161 trucks.

Converting Trucks From Gasoline to Diesel Power

Consideration was first given to the length of haul, mileages to be realized, maximum and prolonged grades to be negotiated, the availability of repair parts, costs of replacement parts, changes taking place in Diesel technology, traffic conditions, residential restrictions, costs of necessary shop equipment for testing, and other factors which are just as important as comparative fuel costs.

It is the company's policy that a definite amount of savings should be realized over a period of time as a return on the investment, and it is not planning to write off the investment in terms of a few years. Repair shops and skilled mechanics are constantly on the job to do any type of repair work to preserve the engine life up to the time when the chassis is no longer serviceable and it is time to make a complete change.

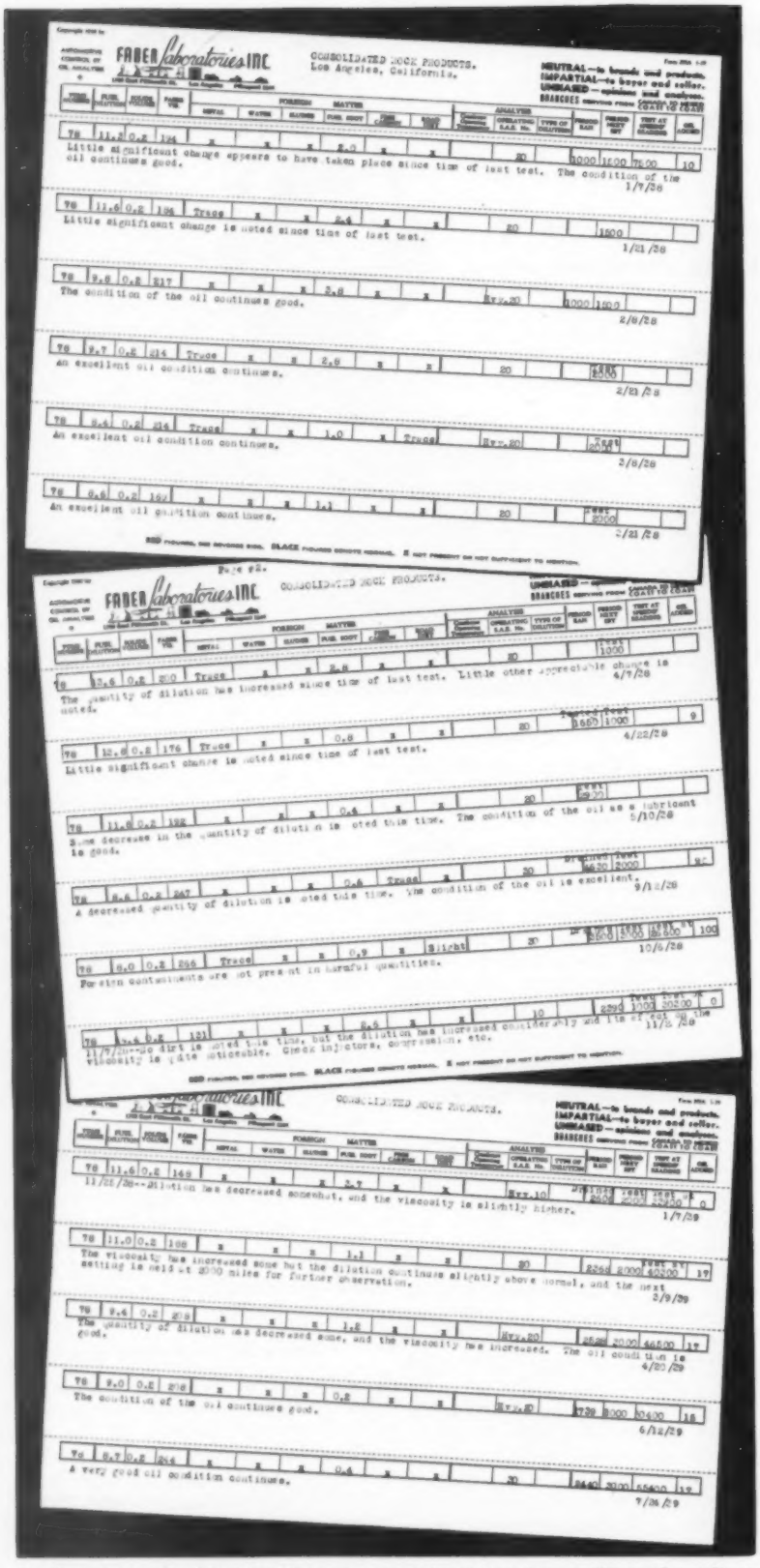
Eventually, judging from experiences to date, more of the existing gas trucks will be converted or new Diesel-powered trucks added. Of the 76 now in service, 34 are replacements. New trucks are all Diesel-equipped. Most of the newer trucks are Diamond T and Mack and the engines are divided between Cummins,Hercules and Buda. These are Cummins AA600 engines rated at 109 hp.; Cummins HB6, 125 hp.; Hercules DJXC, 83 hp., and Buda DT468, 117 hp. engines.

Four classifications of trucks are used. These are a 4-wheel truck carrying six tons of aggregates, a 6-wheel truck hauling 10 tons, tractors and trailers hauling 20 tons and semi-trailers with a capacity of 22 tons. All are equipped with 5 and 7-speed transmissions.

Comparative Performance

For hauling ready-mixed concrete in transit mixers, Diesel engines were not considered because of the possible inconvenience from fumes when the trucks are backed into close quarters in discharging concrete. Thirty gas trucks are used for delivery of that commodity.

Los Angeles and its multitude of suburbs comprise one of the most congested traffic sections in the coun-



Continuous record of test data is kept on each truck based on analyses of crankcase oil. Recommendations for engine maintenance are made from this information. Figures are typed in with a red ribbon when a dangerous condition exists, requiring immediate attention

try. On its outskirts are numbers of smaller cities, such as Hollywood, through which aggregates must be hauled. The city proper is flat but trucks cannot go far in any direction from downtown Los Angeles without encountering mountains. In the Hollywood area grades as high as six percent must be negotiated for as far as three miles without a letup and much of the traffic must go over these hills and, incidentally, through the residential districts. Exhaust discharges are practically free from dirty smoke because of the attention given to efficient engine performance.

Practically all haulage is from the producing plants to destination or to the various distributing bunkers throughout the area. At the bunkers a single gas-powered truck is stationed to service jobs in the immediate vicinity. Diesel truck hauls average 12 miles to the trip, ranging from one to 35 miles, and practically all trips are through heavy traffic where the Diesel-powered units have proved very flexible. Each operates a longer mileage than the displaced gasoline trucks, which at the time they were converted were much inferior in power and more apt to be stalled in heavy going. Over a month's time the average operating hours for each is 250 and the mileage is about 4000. Speeds are maintained equal to that of the general highway traffic on the open roads.

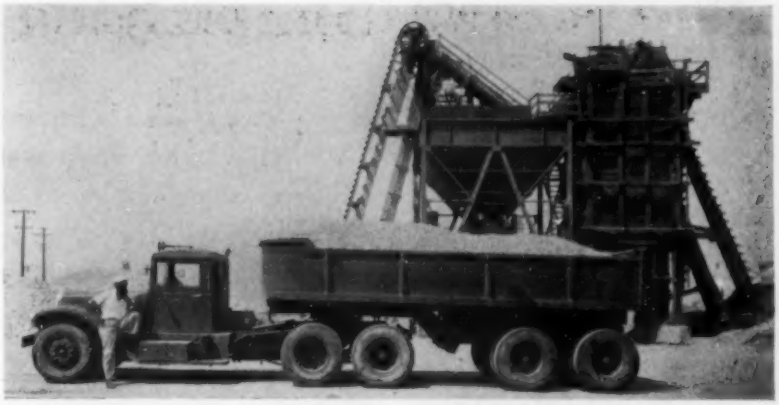
As far as fuel costs are concerned, according to Mr. Earl Smith, transportation and distribution manager, 75c is saved for every dollar formerly spent for gasoline. Western fuel oils cost about 8c per gal., including 3c tax, as compared to 14c for gasoline, and the average truck mileage per gallon is doubled. Trucks hauling 10 tons pay load are averaging 10 miles to the gallon of Diesel fuel oil as compared to 5 for the gasoline trucks (old trucks) and the large capacity trucks are getting six miles to the gallon.

Cost Less to Maintain

Fuel oil storage is maintained at three garage stations; at North Hollywood in the San Fernando Valley, at El Monte in the San Gabriel Valley, and at the Alameda street yard in Los Angeles. As far as maintenance is concerned, an increase in general running repair is offset by a saving in mileage realized before major overhauling is needed. Regular running expenses and needed minor attention are about 10 percent higher between general overhauls. It was the practice with gasoline engines to tear them down at about 70,000 miles for re-

boring cylinders, new pistons, valve grinding, new bearings and overall re-conditioning. As a contrast, at 110,000 miles the first Diesel engine has been taken out of service for similar work and it appears that this will be the general average.

No doubt this performance is due in part to the extreme care in maintenance and the policy of detecting future mechanical troubles before they develop and correcting all abnormal conditions. Recognizing the need for economies in delivery equipment, the company has gone to an extreme to prolong truck and engine life.



Diesel-powered tractor and trailer unit which hauls up to 22 tons of material

Analyze Crank Case Oil for Motor Troubles

As a guide to where and when abnormal engine conditions are developing, the company has engaged the services of Faber Laboratories, Inc., Los Angeles, a concern which specializes in crankcase oil analyses and interpretation by chemical engineers. This service, called "automotive control by oil analysis," is done systematically and comprises regular analyses of crankcase oil samples and submission of the findings to the company together with recommendations for correcting certain engine conditions. This system is based on the logical theory that excessive bearing wear, water leakage, excessive oil dilution, foreign matter and other indicators of trouble will reveal themselves in the used oil, if tested regularly, in time to make adjustments before a failure occurs.

Findings of the laboratory, which now operates nationally and has had years of experience in the analysis of truck engine performance, are followed religiously by the company's trained mechanics. At first, samples were tested weekly, but are now made twice a month.

Each truck is numbered and a running record of test data is kept for it on a special card. Test samples are taken at the various garages and copies of the report sent directly to the head mechanic for his inspection and files. One of the running reports illustrated herewith shows the type of information derived from the tests. It will be noted that the entry under each heading is recorded for each test so that changes may be noted for any operating period. If a condition should become serious, such as an increase in oil dilution to 14.4 percent in one case, the information is typed in red as a warning. In that event recommendations are made.

It will also be noted that the viscosity had decreased from 30 to 10 and that the mechanic was advised to check the injectors, compression, etc. This was done and the next entry showed the condition to be remedied. Similarly, any appreciable amount of water in the oil would suggest checking for leaky gaskets, metal might suggest excessive bearing wear, etc. Too much foreign matter, such as sand, would be called to the mechanic's attention. Neglecting these conditions could only result in excessive wear, improper lubrication or whatever the case may be, and early failure.

Truck Operating Practices for Maximum Efficiency

The particular chart illustrated is one of the more conservative—charts of other truck engines may reveal very sudden changes in oil dilution, etc., which would have become dangerous if undetected and uncorrected or which indicate fuel oil wastage. These are just a few examples of the service rendered, the net result of which has been a highly efficient fleet of truck engines safeguarded against major breakdowns and unnecessary heavy wear on mechanical parts. Practically every conceivable difficulty in mechanical operation is detected and corrected at the time it is discovered. As a result, fuel efficiencies, etc., are all that may be expected. The service is paid for at a low rate per month for each truck.

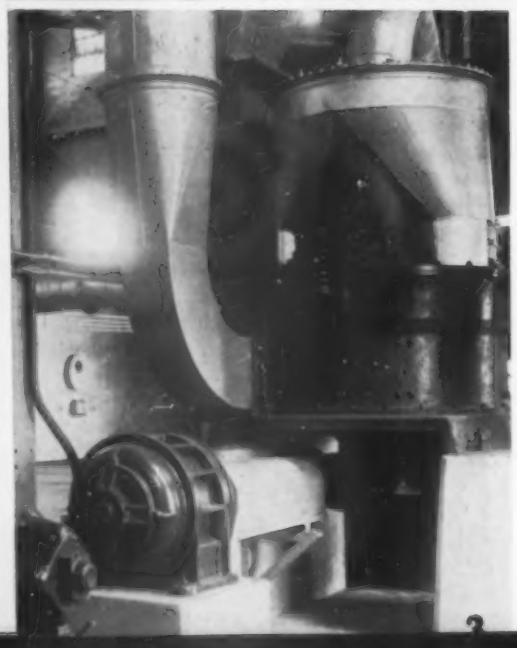
To follow up these recommendations, the company maintains machine shops at each garage, and a complete shop under the direction of a highly-skilled mechanic at the Alameda yard. All maintenance work, major overhauls and engine installation work is done by company trained men.

Certain definite practices are followed in order to get the best efficiency. For example, 150 deg. F. is considered the most desirable engine temperature for combustion efficiency and to insure proper lubrication. Before going into service each truck is run idle in the yard for about 20 minutes each morning until the engine reaches that temperature. On the job these temperatures will hold 30 or 40 minutes when the engine is stopped. As the engines become older, the gravity of the lubricating oil is increased, until analyses show that excessive ring wear must be corrected. Greasing is done about once a week, dependent on mileage, and washing is done on a definite schedule. The driver checks the crankcase oil, tire pressures, transmission and differential grease levels daily and a greaser attends to the latter when needed.

Being a big user of tires, care also is taken to prolong their life. Improper inflation, according to company experience, is the main cause of excessive tire wear. A 100 percent puncture sealing tube with a 1-in. wall is used for each tire. Oil changes are ordinarily made at 5000 miles, unless tests indicate a condition shortening the life of the oil.

Advantages Summarized

To sum up Mr. Smith's experience with Diesel truck engines; it is essential to have experienced mechanics, to be located close to repair parts, to keep apace with rapid changes in Diesel engines, and to maintain certain special test machines for injectors, compressor pumps, etc. While Diesel engine crankshafts, connecting rods, and other parts are heavier and therefore more costly, he believes advantages are to be found in the elimination of distributor points, carburetors, spark plugs, magnetos and saturated wiring that caused major outlays before the changeover.



Simplifying Coal Handling

Two types of automatic coal feeders control flow from main storage bin to conveying system leading to direct firing coal mills

By RALPH S. TORGERSON

DRIERS, mills, feeders and a complicated system of handling coal have been replaced by direct-firing coal mills at the Greencastle, Ind., plant of Lone Star Cement Corp. The new installation has removed the hazard of spontaneous combustion and has brought about better working conditions for employes. It also has improved the control and simplified the firing operation. Although the direct-firing coal mills have not been in service long enough to establish reliable comparative cost figures, it is believed that there has been an appreciable reduction in fuel consumption.

It is a wet process plant having four 10- x 240-ft. kilns. At the present time only two of the kilns are in operation, and each of these has been equipped with the new type 442 Raymond direct-firing coal mills. However, a foundation has been provided in the floor of the kiln firing room for a third coal mill whenever it is believed desirable to increase capacity.

To obtain a better picture of the changes, a brief description will be given of the old installation. Coal was formerly unloaded from hopper type railway cars into the main storage bins. An overhead traveling crane equipped with a bucket loaded coal into an elevated hopper feeding a single roll crusher. The product of the crusher was carried by bucket elevator to the coal drier bins and from thence was chuted to two rotary type coal driers. From the driers the coal was elevated to tube mill bins, each serving a 7- x 24-ft. compartment mill. Pulverized coal from the tube mills was then transported by means of two Fuller-Lehigh pumps to three 35-ton steel conical storage bins, two of which are now in use over the new Raymond mills on the burner floor.

1—Tunnel conveyor under coal storage, showing automatic apron feeder in center and one end of auxiliary feeder. 2—Second auxiliary feeder with roller guide to control height of coal on belt. 3—Rear view of bowl mill

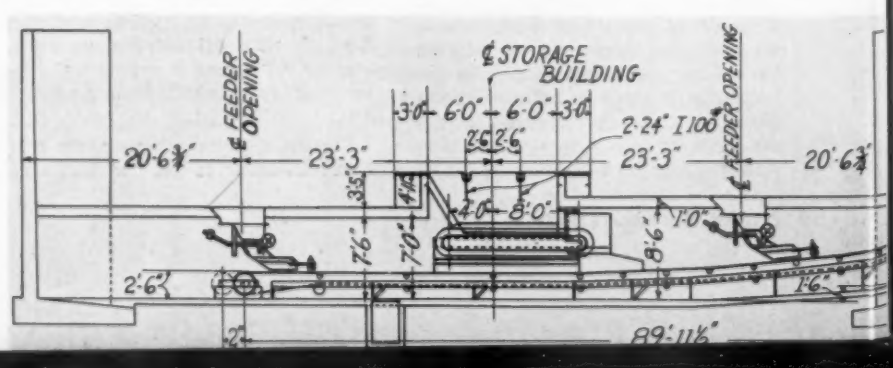
Below is shown the details of tunnel conveyor under coal storage and two types of feeders

Changes Made in Method of Coal Handling

With the new direct-firing coal mills, the separate coal pulverizing mill building and equipment is no longer in use. Coal handling also has been simplified. Cars of coal are dumped directly over a hopper in the coal storage bin. Below this hopper a concrete tunnel has been constructed in a transverse direction to the track above in which a 24-in. belt conveyor, 89 ft., 11½ in. centers, has been installed. Coal is fed in measured quantities to the belt by means of a 24-in. horizontal apron feeder, the operation of which is controlled by a push button station conveniently located on the kiln burner's floor. A Bindicator installed in the second 35-ton storage bin automatically stops the apron feeder and shuts off the feed to the conveyor belt when the bins are full.

Two Types of Coal Feeders

In addition to the apron feeder, an auxiliary automatic coal feeder has been provided over the belt a short distance from each end of the apron feeder. These auxiliary feeders, which were designed by the Lone



For New Mills

Star Cement Corp., are employed in case coal is to be taken from the coal storage bins at a time when no coal is in the hopper and it is not convenient to move a car over the hopper. The auxiliary feeders draw coal from openings in the main coal storage bin, and automatically control the level of coal on the belt by a roller connected to an arm extending from the feed chute and pivoted to a counterweighted shut-off gate on the feeder hopper. When the coal on the belt is too high, the roller moves up, actuating the shut-off gate and cutting down on the feed.

At the head end of the tunnel conveyor belt is a magnetic pulley which removes any tramp iron or scale in the coal. Another 24-in. conveyor, 118 ft., 3½ in. centers, at right angles to the tunnel conveyor picks up the coal and moves it on an incline up to the burner floor where the coal is dumped into the boot of a bucket elevator, 39 ft., 6 in. centers. From the bucket elevator, a 16-in. screw conveyor moves the coal horizontally over to the 35-ton steel storage bins above the Raymond coal mills.

An interesting arrangement has been provided to distribute the coal to the two bins. In the screw conveyor above the first coal mill storage bin is a distributing gate. This gate is a sleeve which conforms to the shape of the screw housing and is manually set to permit any desired portion of the coal fed by the screw to drop into the pipe leading to the storage bin. Normally, the gate is set so that half the coal continues through the screw conveyor to the second bin. With this arrangement, one Bindicator on the second bin controls the level in both bins. All

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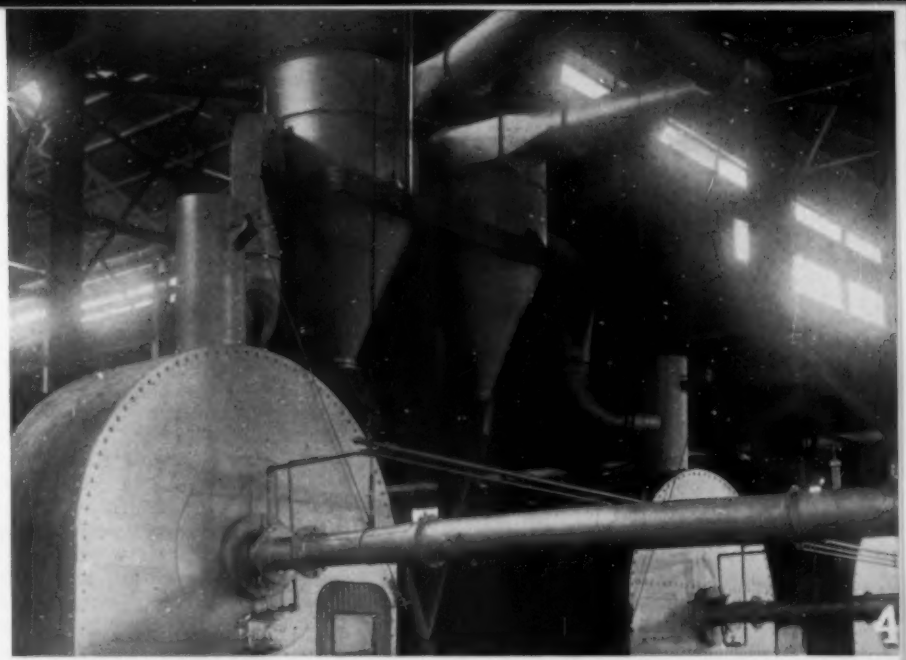
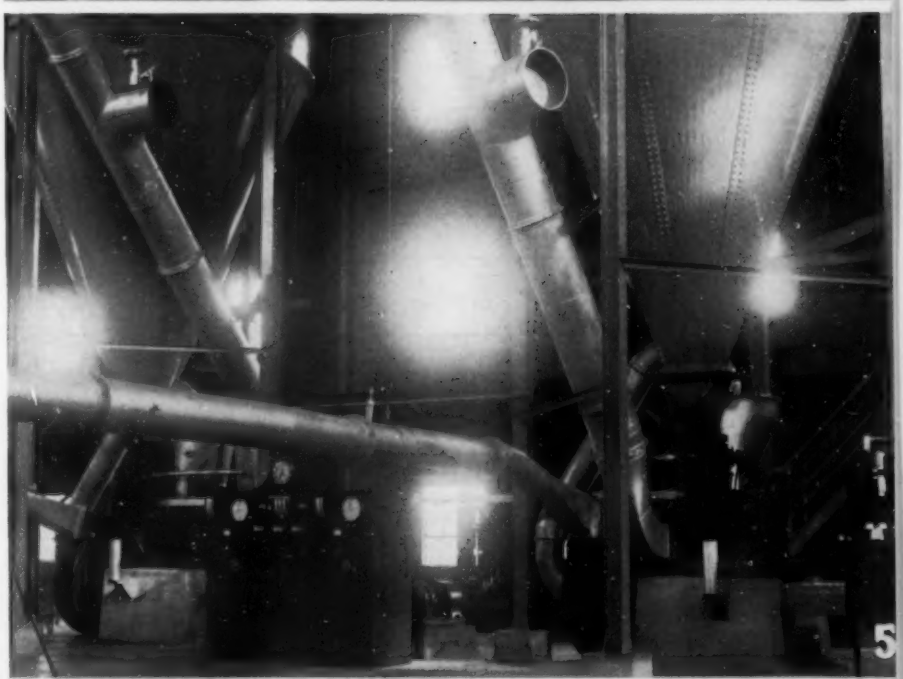
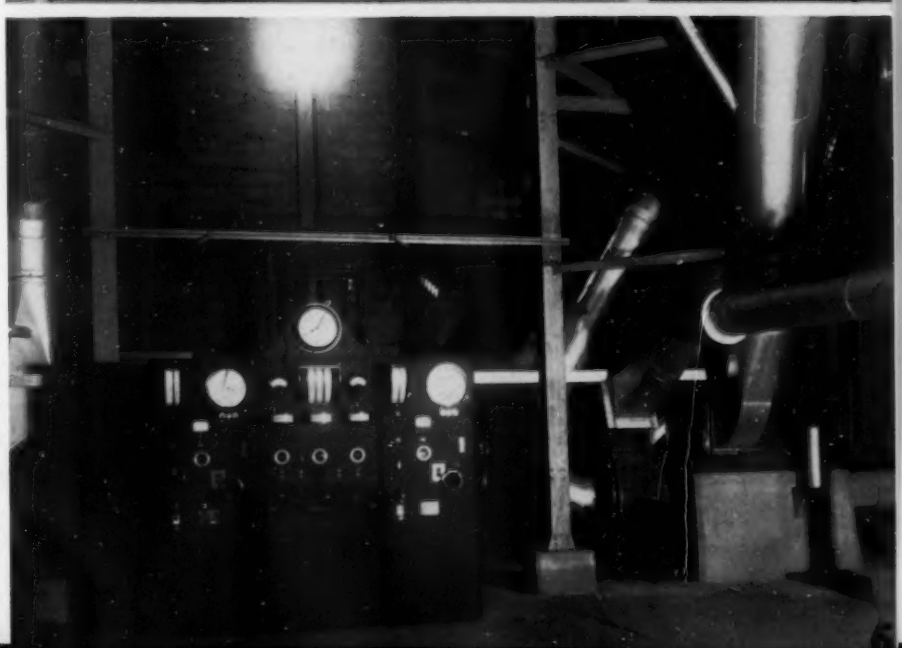
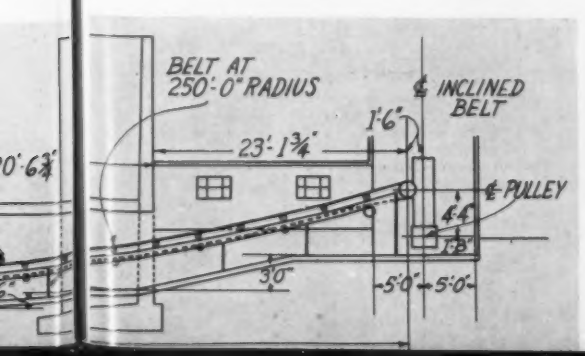






4—Primary air for coal drying and firing is taken from top of kiln hood, the hot gases passing to the small cyclone dust collector shown above. 5—Hot gases on their way to bowl mill pass through pipe in which there is a cold air tempering inlet with an automatic damper. 6—Instrument panel



Grounding Electric Shovels to Reduce Shock Hazard

ELECTRIC SHOVELS and similar excavating machines are universally in use in the rock products industry as these units have demonstrated outstanding efficiency. Certain precautions, however, have to be exercised to eliminate the hazard of electrical shock which may be present under conditions where equipment is not properly grounded. A study of the causes of electrical shock to operators and others working about electrical excavating machinery, and recommendations whereby this equipment may be safeguarded have been presented in a

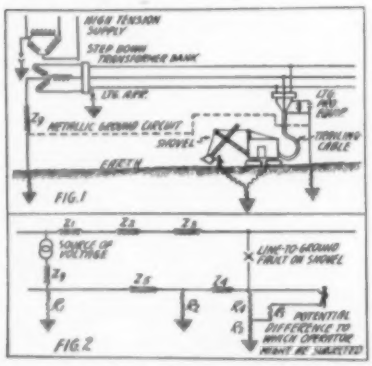


Fig. 1: Circuit diagram of a typical distribution system with Fig. 2, an equivalent impedance network showing line-to-ground fault on shovel

report by engineers of the General Electric Co. A brief summary of this report and the recommendations therein follows:

At the present time, the system of using a solid ground return, of adequate capacity and low impedance, from the shovel back to a grounded neutral at the transformer bank is probably more widely employed than any other. However, many 2200-volt and more power supply systems used in connection with excavators have delta-connected transformers, necessitating additional equipment (grounding transformers) to locate and ground the neutral. Many of these systems therefore operate ungrounded and without any adequate protection against ground faults.

For example, in the case of a short-circuit between one line and the shovel frame where a solidly grounded neutral is being used, assume that the impedance of the grounded power line, from transformer to point of short circuit, is the same as the impedance of the ground-return circuit from the point of short-circuit to the transformer neutral point. The 2300-volts supplied by the transformer leg under short circuit (assuming a 4000-volt Y-connected transformer bank and normal voltage maintained under short-circuit conditions) is dissipated in the circuit from the transformer to the shovel and the ground return. This involves a drop of 1150 volts in the line and 1150 volts in the ground return. It is evident, then, that the shovel frame is at a potential 1150 volts above that of the transformer neutral. If the shovel has its treads on insulating rock, and an operator contacts the shovel structure while standing on conducting earth (which will be at the potential of the transformer neutral point), he will be subjected to the 1150-volt potential gradient between the shovel frame and the transformer neutral point.

Preventive Measures

To prevent electrical shock to a shovel attendant standing on the ground and touching some part of the shovel frame at the time a line-to-ground fault occurs (either as a result of accidental mechanical contact or insulation failure), several preventative measures have been suggested. One involves the installation of a ground-electrode system surrounding the shovel and inter-connected with the shovel frame by good conductors which would maintain the entire area within the system at a common potential, thereby eliminating the possibility of appreciable voltage difference between the shovel frame and the surrounding earth. Another method suggested is the use of insulated ladders or platforms; some utility companies instruct attendants in the use of an insulating crutch on one foot. The third method is to eliminate or reduce the possible ground current to a value which will not involve sufficient voltage between shovel frame and earth to result in a shock hazard. The conclusion is reached in this report that the third method (impedance-grounded-neutral system) is the only form which is generally suitable for all types of systems.

In Fig. 1 is shown a circuit diagram of a typical system with an equivalent electrical-impedance network shown in Fig. 2. It includes a main step-down-transformer station to which power is fed by a high-tension system, and from which low-tension power is distributed over a primary system of overhead open transmission lines. The method of providing protection against lightning also is shown. Various impedances involved in this system are identified in Fig. 2, as follows:

Z_1 = Effective impedance of the supply system, including step-down transformer
Z_2 = Effective impedance of the overhead distribution line
Z_3 = Effective impedance of the line conductors in the trailing cables
Z_4 = Effective impedance of the ground-return conductor in the trailing cable
Z_5 = Effective impedance of the metallic ground-return circuit from the trailing cable to the substation ground terminal
Z_g = Effective impedance of the ground-current limiting device at the substation
R_1 = Grounding resistance at the substation
R_2 = Resistance of the grounding terminal at the pole-line end of the trailing cable
R_4 = Effective contact resistance between the shovel treads and the immediately surrounding earth
R_5 = Effective contact resistance between a man and the earth on which he stands
R_3 = Effective earth resistance between the junction of R_4 and R_5 to mean earth potential

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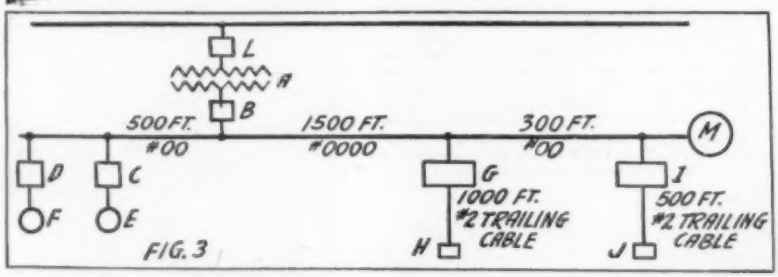


Fig. 3: Circuit diagram of distribution system for electric shovel installation. (A) Transformer bank, (B) 400-amp., 4500-volt oil circuit breaker, (C), (D) 200-amp. circuit breaker, (E) 200-hp. crusher motor, (F) 75-hp. compressor motor, (G), (I) 200-amp., 2500-volt circuit breakers, (H) 3-cu. yd. dragline, 200-hp. motor, (J) 4-cu. yd. loading shovel, (K) 66,000-volt, high tension line, (L) circuit breaker, (M) overhead line

Road Mix Sells Aggregates

Batching and mixing operations in production of bituminous road mixtures controlled hydraulically by one operator

By BROR NORDBERG

IN RECENT YEARS an increasing number of sand and gravel plant operators have taken on a sideline to increase sales and give a more complete service to the contractor or builder; such as, the manufacture of concrete products, stabilized road mixes, and hot and cold bituminous mixes.

These expansions generally prove their worth, and in the long run justify the investment for modern facilities. One of the most modern asphalt mixing plants constructed with this objective was recently installed by a producer of aggregates in Ohio.

Batching and Mixing Operations Controlled Hydraulically

This unit, which features hydraulic control of the key operations, is the Troy, Ohio, plant of the Bowsman Washed Sand and Gravel Co. Built by Hetherington and Berner, Inc., Indianapolis, Ind., it is said to be the first plant where the batching and mixing operations are controlled hydraulically.

Of all-steel construction, the plant has a capacity of 75 tons of hot or 35 tons of cold mix per hour and requires the services of but one skilled operator. Location of the asphalt plant adjacent to railroad facilities is a convenience in receiving asphalt in tank cars and also is used for some outgoing products.

Three 10,000 gal. steam-heated insulated tanks are used to store the asphalt. Adjacent to these tanks is a new power plant in which a Leffel boiler develops steam at 100 p.s.i. for heating the asphalt in storage prior to transference to the asphalt plant and for use in pumping asphalt into the storage tanks.

From the steam plant, a pipeline has been laid under the railroad track with a fitting to connect directly to the coils in the steam-heated railroad cars. When heated to a fluid condition, a 10,000 gal. car is emptied in about 2 hr. by a pump which discharges into either storage tank. The pipeline, which is 3 in. in diameter, surrounded by a 4-in. diameter pipe to provide a steam jacket, is connected to a pump (Viking) driven by a 5-hp. Master Gearhead motor. This pump also is used to transfer heated asphalt from storage into a weigh hopper at the mixing plant.

Close-up of bituminous road mix plant showing hydraulic controls on platform

The automatic steam boiler and the aggregate dryer, are fired with two 2-in. Maxon burners, using natural gas fuel. Boiler water is pumped into a feed water tank of 200-gal. capacity from a well below the steam plant, using a ¾-in. Uniflow (Uniflow Mfg. Co., Erie, Penn.) pump driven through V-belt by a 1/16-hp. motor. Steam condensate is returned into the boiler by a 1½-in pump (Micro-Westco, Inc., Bettendorf, Iowa) driven by a 3-hp. motor, the pumping of water being controlled by mercoid switch.

Feed to Dryer Varied with Aggregate Moisture Content

Mixing equipment consists of a hopper feeding aggregate to a chain bucket elevator which discharges into a rotary drier; a vibrating screen, bins, and the mixing floor.

Aggregate of various sizes is trucked from the producing bins or stockpiles and discharged by the trucks into a three-compartment hopper. Below the hopper are adjustable flow gates and a feeder which discharges into the elevator buckets.

The dryer is 5 ft. in diameter, 30 ft. long, and operates with induced draft provided by a size 60E American Blower Co. fan. Moisture in the aggregate is driven off in the dryer, the material being heated to a definite temperature before being placed in the bins over the mixer hoppers. For maximum efficiency, the dryer is operated at constant speed and the two 2-in. Maxon natural gas burners are maintained at definite pressure, only the feed into the dryer from the hoppers being varied to meet aggregate moisture conditions.

A Brown pyrometer electrically records the temperature of the aggregate at the discharge end of the dryer and in the bins, and the feed of aggregate from the hoppers is adjusted to maintain a given temperature. For hot mixes, the temperature at the discharge end of the dryer is kept at 540 deg. F. with a natural gas pressure of 30 to 35 p.s.i., and in making cold mixes the aggregate temperature is 150 deg. to 200 deg. F. with a burner pressure of 5 p.s.i.

To the left of elevator is the aggregate dryer; center, above, is the sizing screen, and below are the bin and control platform

Material from the dryer discharges to a 50-ft. chain bucket elevator that places it over a 4-deck, 3- x 6-ft. Deister Plato screen where five separations are made. Oversize is chuted into a separate hopper, and the graded gravel and sand drops into four 10-ton bins over the weighing hoppers.

One Operator Controls Plant With Six Levers

On the operator's platform are the weigh hoppers, scales, pug mill mixer box, and all controls for their operation. The 3000-lb. capacity mixer box, which is driven by an electric motor is of the pug mill type with two sets of mixing blades. Asphalt is pumped at 250 deg. F. from the storage tanks to the mixing plant after steam heating the tanks about two hours. The asphalt is metered separately from the aggregate by a Brayer asphalt meter. A scale and weigh box are provided for aggregate.

Six simple levers are used by the operator to control the mixes, insuring correct and rapid handling. Each lever sets a certain hydraulic cylinder into operation, the operations being done under 200 p.s.i. hydraulic pressure through 2-in. diameter cylinders. The valves are Vickers hydraulic type.

The lever releases sand from the overhead bin into the weigh box; three others are used to release ⅜-, ¾- and 1½-in. stone into the weigh box; and another releases the weighed aggregates into the mixer box. After the dry mixing time the Brayer asphalt meter discharges the asphalt, a turn of a steam valve discharges the mixer box through a slide door into trucks. The mixer box is steam-jacketed.

Generally, 20 seconds is allowed for thorough mixing of the dry materials and 30 to 45 seconds after all ingredients have been added. The plant is equipped with a time lock device which insures that proper mixing has taken place before the mixer box can be discharged. A 125-gal. tank for naphtha, used in cold mixes, is also provided. The naphtha is measured in a calibrated 5-gal. measuring tank and released into the pug mill through a spray pipe.

The dryer, bucket elevator and hopper are belt-driven from a 50-hp. motor. A 60-hp. motor drives the rest of the plant through flat belt and chain drives. Practically all deliveries, which have been confined to the Troy area, have been made in 7-ton trucks with insulated beds covered with tarpaulins.

Since this plant has been placed in operation, a separate organization has been set up to produce and sell bituminous road mixtures. This part of the business is called the Miami Bituminous Materials Co., Troy, Ohio. It was considered desirable from the standpoint of sales and production to divide these activities from the sand and gravel end of the business.

Simplify Coal Handling

(Continued from page 31)

conveyors, elevators, etc., from the coal storage bins to the coal mill storage bins on the burner floor are interlocked electrically so that if any trouble develops, the equipment back of the source of trouble will stop.

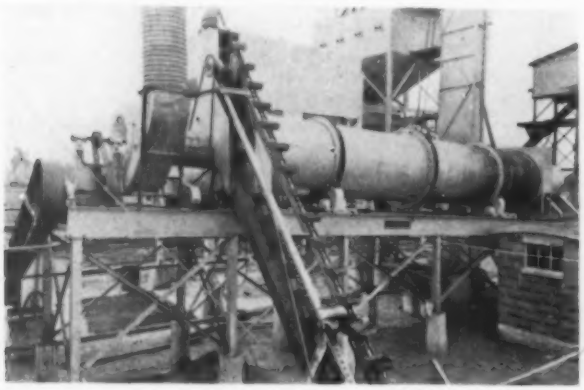
Coal purchased consists of screenings ranging from ¾-in. to 0 and can be handled without any trouble by the Raymond direct-firing bowl mills, no preliminary crushing being necessary. Primary air for coal drying and firing is taken from the top of kiln hood, the hot gases passing to a small cyclone dust collector or dust trap. From the dust trap the cleaned, hot gases on their way to the bowl mill pass through a pipe in which there is a cold air tempering inlet with an automatic damper to control the temperature of the air to be taken into the bowl mill.

The temperature of the gases admitted to the mill varies with the moisture in the coal. However, the mill discharge temperature is thermostatically controlled by a damper in the tempering tee inlet and held practically constant at a desired set temperature. Besides there is a hand controlled damper on top of the kiln hood to admit cold air in addition to thermostatic control, if needed.

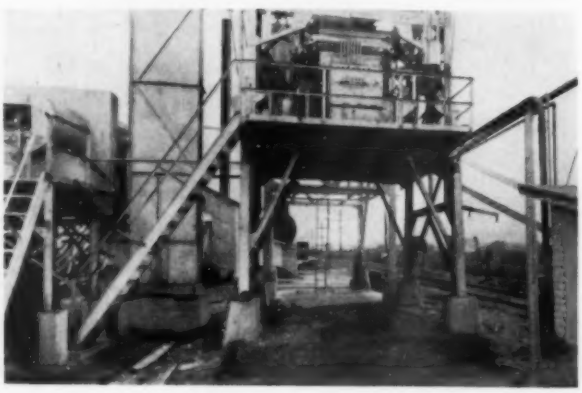
Each of the Raymond mills has an interesting means of ejecting heavy foreign particles and pyrites. A pocket is provided in the base of the mill, and as the material being ground is whirled around inside, the coal is sucked out by the fan when it becomes fine enough, and any heavy particles find their way into the pocket in the base from which they drop into a wheel barrow.

Direct-firing coal mills make possible more uniform temperature control, more efficient utilization of fuel, and prevent "puffing" or blow back of kiln gases at the hood.

Dryer, induced draft fan and elevator for feeding aggregates into the dryer. In the background is the batching plant



To the left are the twin burner pipes for the dryer, using natural gas as fuel. To the right is the operator's platform



Health In the Cement Industry

Three years study by Saranac Laboratory of dust conditions in 17 plants and medical examinations of employes in 11 plants reveals health status of industry

By A. J. R. CURTIS*

THREE YEARS of surveys and research by the Saranac Laboratory for the Study of Tuberculosis, and another year spent by that institution in correlating and evaluating results, have made available a comprehensive and long-awaited picture of the effects of occupational dust on workers in the cement industry.

This study was published in full in the *Journal of Industrial Hygiene and Toxicology* for September under the title of "Survey in Seventeen Cement Plants of Atmospheric Dusts and Their Effects Upon the Lungs of Twenty-Two Hundred Employes" by Dr. Leroy U. Gardner, director, Thomas M. Durkan, engineer-chemist, Dr. Daniel M. Brumfiel, clinical consultant, and Dr. Homer L. Sampson, roentgenologist of the noted Saranac institution. It is unique in the extent to which the industry was cross-sectioned with respect to both the health of the personnel and the nature of the dusts encountered. The seventeen plants studied have a wide geographical distribution (covering all of the principal cement producing districts) and are representative of conditions prevailing throughout the American cement industry. The number of workers examined reached 2278, about 7 per cent of the estimated total plant force in the United States.

The results, from the viewpoint of medical scientists as well as workers and employers in the industry, are highly satisfactory, supporting the conviction based on a long period of observation by practical observers and students of the cement industry, that the dusts encountered in the usual operations have not produced physical disability.

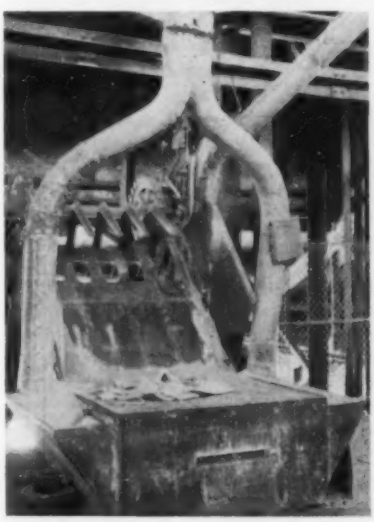
The writer has condensed the original document, preserving the essentials in Dr. Gardner's language and omitting only certain detail. The condensed version of the report follows:

In 1928 the U. S. Public Health Service published Bulletin No. 176 "Health of Workers in a Portland Cement Plant," which paper described the processes of manufacture, defined dust concentrations and attempted to show their effects upon health in a single plant. While most of the employes were given two complete physical examinations, chest roentgenograms were taken in only a few selected cases and main emphasis was put upon absences for sickness during a period of 3 years. The average number of employes at any one time was 254 men, although an active labor turnover accounted for examination of 570 men while the study was in progress. Only 8 per cent of the group had worked in this plant for more than 8 years and employment for as long as 16 to 20 years was limited to 4 men.

From roentgenograms of the lungs of 53 employes selected from different departments, it was inferred that the inhalation of cement dust produced a pneumoconiosis although it was never productive of symptoms in any of the men examined. The reaction was always of a linear type, so slight that it was difficult to compare with that observed in other industries.

In 1938 the Portland Cement Association published a report of sickness absenteeism and mortality in 81 member cement plants for the year 1937. This bulletin, covering 14,148 employes, showed no evidence of unusual amounts of chronic respiratory illness in the industry.

Bag elevator with dust collector



The conclusion of the Public Health Service report that inhaled cement dust produces an asymptomatic pneumoconiosis has been generally accepted. It seems to have been overlooked, however, that this conclusion was based upon roentgenographic and physical examination of a very small group of employes, working for comparatively short periods, in a single plant. Following

D. S. McCrum making a count of dust samples by both light and dark field illumination

South African precedent, the shadows in the films of these men were interpreted as evidence of *fibrosis* of the lungs even though it was shown that the dust assumed to have produced these shadows was very different from that of the Rand gold mines, which averages some 80 per cent free silica.

Saranac Laboratory Study Covered Seventeen Plants

In 1935 the Portland Cement Association requested the Saranac Laboratory to survey a representative group of its member plants to determine the quantity and nature of the dust in the atmosphere and to discover by examining a large group of employes whether this dust had produced significant changes in their lungs. This offered a welcome opportunity not only to evaluate possible

*Secretary, Committee on Accident Prevention and Insurance, Portland Cement Association.

Detailed occupational histories were taken of each employe either by the staff of the Portland Cement Association or by a member of the local office force

hazards in the cement industry but to study the effects of breathing relatively high concentrations of dust, assumed at the time to be low in free silica.

Accordingly members of the laboratory staff visited 17 widely distributed plants. Mr. Durkan, assisted by Mr. D. S. McCrum, investigated the various raw materials and the atmospheric dusts. Chemical and petrographic analyses have been made to determine their composition. Dust, collected by impinger, was counted by both light and dark field illumination. The latter was employed to supplement the standard light field counts and to determine whether any excess of fine particles existed in particular locations. Estimations of dustiness, however, were always based upon the light field counts.

Dr. Brumfiel has personally made or supervised the physical examination of all employes in six of the plants. In five others local medical consultants made such examinations. Stereoroentgenograms of the chest of all the employes in eleven of the plants were taken either by local roentgenologists, where they were available or by a mobile unit of "Precision Radiographs." In all cases films of excellent quality were secured and submitted for interpretation to Dr. H. L. Sampson.

Detailed occupational histories were taken either by the staff of the cement association or by some member of a local office force. Their participation seemed advisable because the necessary information could be obtained more accurately by persons familiar with the industry and local plant conditions.

The essential ingredients of portland cement are CaO, SiO_2, Al_2O_3, and Fe_2O_3. The chief raw materials that supply these constituents are limestone to furnish CaO and shale or clay to yield other ingredients.

Manufacturing Conditions

In the Lehigh Valley, argillaceous limestones contain almost exactly the requisite proportions of necessary constituent minerals. In some other places, however, substances such as marl, oyster shells, or alkali waste have been used in place of limestone; blast furnace slag and in isolated instances sand or sandstones, slate, bauxite, coal ashes, iron ore, and argillaceous limestones have been added, usually in small amounts. For modified cements more highly siliceous materials may be added in comparatively small proportions. The limestones are sedimentary rocks high in calcium carbonate but composed of a number of different minerals. Those used in the manufacture of cement usually contain a small quantity of free silica as chalcedony or quartz, varying between 0.3 and 11 with an average of 3.2 percent.

The shales and clays contain much larger proportions of quartz; for the former the values ranged between 19 and 36 per cent and for the latter, between 11 and 24 per cent. The sands and sandstones vary in quartz content from 32 to 91 per cent. There was 29 per cent of quartz in the granodiorite used in one location. In blast furnace slag there is no free silica. It should be emphasized that these analyses are based upon a combination of chemical and petrographic methods and that they are, therefore, much more likely to approximate the actual free silica content than the use of either method alone would permit.

Raw materials other than limestone may contain considerable proportions of free silica; however, such materials are usually ground with the limestone so that the free silica content of the mixture is relatively low. For ordinary cements they never exceed 12.0 per cent of the mix and they average 6.6 per cent.

Although the component analysis indicates 19.86 per cent of silica, the column headed "Calculated Compounds" reveals that almost none of this silica exists in free state. Seventeen samples of finished cement from as many plants were subjected to petrographic and chemical analysis for free silica. The maximum content of such silica was 0.12 per cent and the average value for all the samples was 0.04 per cent.

TYPICAL ANALYSIS OF PORTLAND CEMENT

Component Analysis	%
SiO_2 (Total)	19.86
Fe_2O_3	3.63
Al_2O_3	7.37
CaO	65.08
MgO	1.06
SO_3	1.78
Ignition Loss	0.73
	99.51
Calculated Compounds	
$3CaO.SiO_2$	50.4
$2CaO.SiO_2$	19.0
$3CaO.Al_2O_3$	13.4
$4CaO.Al_2O_3.Fe_2O_3$	11.0
$CaO.SO_3$	3.0
CaO	0.9
MgO	1.1
Free silica (SiO_2)	0.01
Ignition loss	0.7
	99.51

Atmospheric Conditions

In the following discussion of dust concentrations in the different departments, the figures represent millions of particles 10 microns* and less in diameter per cubic foot of air. The phrase, "Particles per cubic foot" will hereafter be omitted but it should be understood wherever a figure is used to indicate dust concentration. It should also be borne in mind that the standard U. S. Public Health Service technic, used in this and most other American dust surveys, demonstrates the total number of particles 10 microns and less in diameter that are suspended in the atmosphere. When it is recalled that the 10-micron limit represents the maximum size of most particles found in the lung but that only those of free silica 3 microns or less in diameter are capable of producing much reaction, these figures may lose some significance.

(Continued on page 38)

*One micron is .001 millimeter, or approximately 1/25000 of an inch.

Washing–Classifying Sand

Part 7.—Importance of setting classifiers level and other practical information on their installation, feed and adjustment

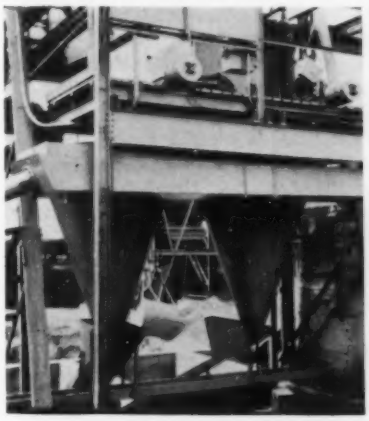
By EDMUND SHAW

IT IS VERY IMPORTANT that the classifier should be set level and plumb. Slight differences in level, sometimes so slight that the eye can hardly detect them, make the current run to one side and spoil the classification. This is most important with classifiers that are handling fine material, or where it is important to save the fines.

The arrangements for putting in the feed and taking off the overflow should be planned and not just put in "any old way." These are especially important in the surface current types of classifiers which are so much used with small dredges pumping river sand, and as collectors of fine sand in other plants. The feed should be evenly distributed across the entrance and the overflow weir should be kept level. If this is not done strong local currents will be created that carry too coarse sand into the overflow. There should be no projections of any kind to make eddies that will settle too fine sand in the classifier. The apron over which the feed enters should have about a 5-deg. slope. More gives a plunging current and less makes a rippling current. If it can be done without too much trouble, it is well to install the classifier so that this angle may be slightly changed until the best position is found. When a surface current classifier is working as it should, it is hard to see any evidence of flow, looking down on the surface. It is worth going to some trouble to obtain this condition.

The overflow launder should be set to take away the overflow without any chance of its backing up. This should be obvious, but the writer has seen classifiers that did not work well because the overflow was continually backing up. One cannot blame the mill man for not wanting to make what may be expensive changes to secure the necessary grade, but it does not make the classifier work any better to understand this. One excellent reason why mechanical classifiers were so popular from the first is that they do not require additional mill height for their installation.

Any plant for sand washing, ore dressing, or other continuous process, must have a uniform feed to do its best work. Given uniform feed and proper adjustment of the plant units, the work will go on hour after hour



Steel structures insure alignment of sand-settling equipment

with very little attention. In the mills treating gold ore in the old West steady running was so much appreciated that it was the basis of a proverb: "If the mine foreman is sitting down, fire him; if the mill foreman *isn't* sitting down, fire him." There is much more to operating a plant than keeping it steadily in motion, but a steady running plant is usually a well-run plant.

Feed for Classifiers

Classifiers are more sensitive to starting and stopping and variations in the feed than most plant units. It takes a little time for the classifier to fill and a little time to empty it when there is a shut-down, and several types must be emptied completely before they will start after a shut-down. This puts a premium on continuous running. But it is even more important that there should not be too many changes in the character of the feed.

The work of classifiers will not be satisfactory if (1) the amount of feed, in gallons or cubic feet per second, varies too much; (2) if the percentage of solids increases and decreases too much; and (3) if the grading of the material to be classified varies too much.

It is easy to see why uniform quantity is important. Suppose it is a drag belt or rake classifier that is being fed. There is no large body in the classifier to act as a surge tank, and a heavy rush of feed will go through it quickly, carrying coarse and fine together out with the overflow. On the other hand, if the feed is much lighter than that for which the classifier has been adjusted there will be too much fine stuff in the product removed by the drag.

Changes in the percentage of solids have another effect. A thick mass of grains in suspension will act as a unit, pressing down on the rising current, decreasing its flow. This puts too much fine in the drag product, or underflow. With classifiers having a column of hydraulic water through which the grains fall, the area of the column is decreased by the volume of the falling grains, and hence the flow between the grains is faster than it would be through the column if the grains were not there, so it takes *less* hydraulic water to raise the fine grains.

This explains too why serious changes in the grading affect the classification. Another reason is that large increases and decreases in fines cannot be handled because there seems to be a lag in the current adjusting itself to changes; that is, samples taken immediately after the change occurs do not show so good classification as those taken a little later.

The above may sound as though the classifier was a sensitive apparatus, and so it is. But in regular running the ordinary variations in quantity, percentage of solids and grading tend to average themselves. If too much of the fines gets into the sand while the feed is light, too few fines will get into it during the period of heavy feeding that follows. Results, while they may not equal those of a well-designed laboratory classifier are quite satisfactory for commercial purposes.

(To be continued)

Health In the Cement Industry

It should not be inferred that the figures to be cited represent maximum dust concentrations in different parts of cement plants. The samples on which the counts were made were taken at points where operators of different machines spent the major part of their time and at face level, as the objective was to obtain an estimate of the total quantity of dust to which the men were exposed.

Comparison of dust concentrations in the several departments of the different plants has been difficult. Variation in plant design and type of machinery has made it impossible to obtain samples at comparable locations in every plant. The concentrations in different plants were so variable that they could not be averaged to express the degree of dustiness for the particular departments. Therefore, maximum and minimum figures will be cited to indicate concentrations in various parts of the plants.

As well drills are lubricated by water they create little dust. The counts varied from 1 to 7 million. Jackhammer drilling for secondary blasting creates more dust but the operators usually take advantage of the wind, which in the large open pits generally prevents excessive atmospheric concentrations. Of 15 quarry counts taken as near the face of the drill runner as possible, 14 ranged between 2 and 83 million and there was one of 135 million. The drilling is intermittent as much time is spent in placing equipment and in many locations the quarries cannot be operated during the winter months. Shoveling and loading cars with rock generally create little dust that reaches the steam or electric shovel cab or the pitmen who manually assist in loading the cars. Counts at the breathing zone of these men varied from 0.3 to 9 million. Clay or shale is generally too soft to necessitate drilling and hence no dust counts are reported for this operation.

Primary crushing, done in a gyratory, jaw or roll crusher usually situated below an exposed platform produces considerable dust but most of it is composed of relatively large particles and natural ventilation prevents high concentrations. The material treated by the primary crusher may be limestone alone, but if the argillaceous minerals are mined separately, they may also be dumped into the crusher in approximately correct proportions. Counts were

(Continued from page 36)

below 100 million except at discharge chutes where they varied from 56 to 352 million, but no men were stationed at this point.

Secondary crushing is done by hammer mills, often completely enclosed, as are subsequent screening operations. The secondary crusher usually creates much more fine dust, particularly in the older mills without modern dust control systems. Eleven counts varied between 38 and 316 million; and one count was 1992 million. Secondary crushing is not always isolated from other processes so that it is often impossible to estimate the actual amount of dust produced by this particular process. Attendants supervise the operation of the hammer mills only from time to time.

Stone Storage.—Where a crane is used to transport the stored rock, the operator is exposed only to the very finest dust that floats upward into his cab. The counts taken in five crane cabs ranged from 0.6 to 140 million.

Raw Mills.—In the raw mill, the proportional rock mixture is reduced to such size that 90 per cent of it passes a 200-mesh screen. This milling is generally effected in two stages with intermediary screening. In the wet plants most of the dust encountered in these areas probably comes from other operations. Counts near the preliminary wet grinding mills varied from 1 to 48 million. Near dry grinding mills the figures ranged from 3 to 239 million. For final raw grinding in the wet plants all counts but one were less than 54 million; in dry plants there were two low counts and seven which ranged from 37 to 631 million.

Kiln Room.—This finely ground raw mix (wet or dry) is then conveyed to the kilns. If it is wet, the "slurry" is sometimes first filtered to eliminate part of the water. The operation of feeding the kilns, regardless of the process used, is not particularly dusty; counts varied from 0.4 to 68 million. The kilns are of the rotary type varying in length from 80 or 100 to over 400 ft. and in diameter from 7 to 12 ft. They are fired by powdered coal, oil or gas to produce temperatures of 2700-2800° F. Dust counts for both coal pulverizing and drying, with one exception, were low at points where men were stationed.

The hot mass or clinker is discharged from the lower end of the kilns. The clinker varies from minute particles to a maximum diameter of 2 or 3 in., the bulk of it being less than ¾ in. Kiln rooms are not particularly dusty. In only one of 39 samples did the count exceed 100 million. When the material leaves the kilns, whatever free silica there was in the raw mixture has been combined to form calcium silicates. Therefore, employes in the finish side of the mill and in the packing and shipping departments are never exposed to significant quantities of free silica.

(To be continued)

Grounding Electric Shovels

(Continued from page 32)

By referring to the diagrams, it will be seen that the resistance R_4 is quite high, resistance R_3 would be very small compared with R_4, the resistance of R_5 would be expected to be quite high, but this is of little benefit, since a value of many thousands of ohms would be required to offer any appreciable protection to a person making contact between the two points indicated. However, the addition of a metallic ground-return circuit making up the impedance of Z_5 would carry practically all the ground current and only a small fraction would return by way of the resistance R_2 and R_1.

Although each specific electric shovel installation must be considered on its merits, the following installation is recommended:

1. Use the limited ground-current arrangement, with a grounding transformer or transformer neutral impedance designed to limit the maximum line-to-ground fault current to a value just sufficient to provide selective tripping of the unit feeder circuit. It is recommended that a time-delay relay be inserted in this grounding circuit, arranged to trip the main power-supply breaker, thereby providing protection in case of a line-to-ground fault between the substation and the feeder breakers and also serving as a back-up for the individual feeder breakers.

2. Install a metallic ground-return conductor connecting the trailing-cable ground conductor with the supply substation neutral unless it is certain that adequate security will otherwise be realized.

3. Provide lightning protective equipment, including arresters for high-tension and low-tension circuits, at the transformer substation, together with combined capacitor-arrester protective equipment at the pole-line end of each trailing cable.

Safety In Mills and Quarries

Cement and Quarry Section of National Safety Congress holds lively session at Atlantic City

AN OUTSTANDING MEETING in point of both interest and attendance was held by the Cement and Quarry Section of the National Safety Council at the National Safety Congress, held in Atlantic City, October 16-20.

In the unexpected absence of Frederick B. Hunt of the Cement and Quarry Section, the meeting was opened by vice-chairman P. N. Bushnell. Early on the program came the annual election in which the following officers were chosen to serve for the following year:

Officers Elected

The following officers were elected: General Chairman, Philip N. Bushnell, manager, department of Personnel and Safety, Missouri Portland Cement Co., St. Louis, Mo.; Vice Chairmen, Richard A. Dittmar, superintendent, Universal Atlas Cement Co., Hudson, N. Y., and Otho M. Graves, president, General Crushed Stone Co., Easton, Penn.; Secretary, A. J. R. Curtis, assistant to general manager, Portland Cement Association; News Letter Editor, Jack Dempster, director of safety, Canada Cement Co., Ltd., Montreal.

Committee chairmen include: Engineering, J. B. Zook, chief engineer, Great Lakes Portland Cement Corp.; Membership, Col. H. A. Reninger, director of safety and welfare, Lehigh Portland Cement Co.; Publicity, David Adam, safety director, Lawrence Portland Cement Co.; Program, H. F. Yotter, The General Crushed Stone Co.; Statistical, W. W. Adams, chief statistician, U. S. Bureau of Mines; Members of the Executive Committee include all of the foregoing officers and the following members-at-large: W. H. Baker, J. E. Baker Co.; E. D. Barry, Universal Atlas Cement Co.; J. R. Boyd, National Crushed Stone Association; R. B. Fortuin, Pennsylvania-Dixie Cement Corp.; F. B. Hunt, Dewey Portland Cement Co.; S. W. Stauffer, National Lime Association; A. L. Worthen, New Haven Trap Rock Co.; T. Avnsoe, Lone Star Cement Corp., and O. M. Graves, General Crushed Stone Co.

The report of the Engineering Committee, submitted by Wm. Moeller (general superintendent, Lone Star Cement Corp., Dallas, Texas), the outgoing chairman, showed that the committee had completed during the year an unprecedented calendar of work, completely revising five of the six safe practices pamphlets sponsored by the Section, covering the following subjects: Raw and Finish Mill Grinding, Cement Burning, Cement Mill Shop Practice, Storing, Packing and Shipping Cement, and Cement Mill Yards and Railroads.

In order to strengthen the Engineering Committee for the task of revising this literature, the following were added to its roll during the year: J. H. Kempster, general superintendent, Buffington, Ind., plant, Universal Atlas Cement Co.; Walter Stauffer, president, National Lime Association; C. H. Sonntag, recently manager, Thomaston plant, Lawrence Portland Cement Co., and A. K. Frolich, superintendent, Louisville, Neb., plant of the Ash Grove Lime and Portland Cement Co.

Analysis of Cement Accidents

A current analysis of cement mill and quarry accidents, which for a decade or more has been an annual feature of these programs, was presented by Ivan F. LeGore, safety engineer of the Portland Cement Association. Mr. LeGore's paper was in part as follows:

The first 6 months of 1939 saw the accident trend continue a downward course which has been uninterrupted since it was so definitely established late in 1936. With mill activity 20 percent above last year's, an average of 13½ accidents per month was reported by 130 plants. This was one accident less per month than the average reported by 119 plants during the first 6 months last year. The 119 identical plants reporting in both 1938 and 1939 held the monthly average down to 12, or 2 accidents less per month than in 1938.

Monthly injury totals held to a narrow range with a peak of 16 accidents in May and a low of 10 in June. Last year there had been a high of 26 accidents in April and a low of 8 in May. This year's injury curve is very consistent in comparison with the curves for either of the past years, indicating that there has been more persistent, better organized effort to curtail accidents throughout the entire period.

P. N. Bushnell, the new general chairman

The accident frequency rate, or score, for the first half of 1939 was 4.00 per million man-hours; the severity rate was at the unprecedented low level of 1.42. This frequency rate was 13 percent lower than the rate of 4.61 for the year 1938; the severity rate was 42 percent lower than last year's rate of 2.44. Largely responsible for lower severity was the occurrence of only one fatality during the entire first half compared with 4 deaths during the first half of last year and 11 for the first half of 1937. There were three less permanent injuries than last year.

At the end of the third quarter the industry had slipped a bit. A new high for the year of 18 accidents was reported during August, and the August peak became a plateau when 19 injuries were reported in September.

With operations continuing about 18 percent above last year, the average of accidents reported for 8 months had advanced to 14, exactly the same as the average for the first 8 months last year. This was for 130 plants, however, compared with 119 plants previously. Five of the 11 new reporters had contributed 17 accidents to the total, so that the average for the 119 identical plants held at 12 per month, or two accidents per month less than in the first 8 months of 1938.

Greater mill activity appears not to have been responsible for the ris-

ing tide during the past two months, for August activity was only 3.5 percent above production for the Campaign month of June, according to data from the U. S. Bureau of Mines. And yet there were 80 percent more accidents in August and again in September than there were in June.

There is no reason to believe that exposure to hazard was materially greater in those two months than it was in June and July. The answer seems to be a too abrupt relaxation of safety effort in some plants, bearing out the point that has been emphasized so often in our industry's safety work: *The safety program cannot be set going and left to run of itself.*

It is much too early to evaluate properly the effect to reduce injury severity other than to say that apparently we are on the right track. An estimated 42 percent reduction in 6 months is no mean accomplishment, for severity largely determines the cost of accidents.

Anticipated reduction in injury severity during 1939 is 30 percent, which should make the rate slightly lower than the previous all-time low rate of 1.80 established in 1932.

Building Safety Into the Plant

David Adam, safety director of the Lawrence Portland Cement Co. plant at Northampton, Penn., led a spirited discussion on the subject of "Building Safety Into the Plant." Mr. Adam introduced the subject by presenting an excellent analysis which stressed the vital requirements for the following seven points in order to build safety into any industrial establishment:

1. First of all, there must be a sound and clear-cut company policy concerning safety, with the well-defined object of building men.
2. Competent training and supervision is imperative by foremen vested with definite authority and responsibility.
3. The human factor must be considered of utmost importance and the right stimulus must be discovered to get from the individual the desired and necessary response.
4. Men must receive full evidence of Management's sincerity and should be made to feel their importance in the organization.
5. Management must keep an open mind and be tolerant.
6. Absolutely fair handling of rules, inspections, complaints, working conditions, discipline for infraction of the rules and matters of that kind is most important.
7. Management and group leadership will not go far wrong in making truth and honest dealing basic principles in everything that transpires.

Thomas G. Quigley, chief quarry inspector of the Pennsylvania State Department of Labor and Industry, said that the first step in building safety into a plant is to sell safety

A. J. R. Curtis, reelected secretary

to the chief executive of the company. From that point, Mr. Quigley said, it must go on down the line. Safety meetings are at their best when attended by the president or chief executive, whose example cannot be over-estimated.

P. N. Bushnell, in adding to this theme, expressed the view that not only should executives be sold 100 percent, but that it was vital that a favorable company attitude be interpreted accurately and actively by the foremen.

Others who participated in the discussion included Wm. H. Baker of the J. E. Baker Co.; A. S. Hetherington and C. R. Cline of the Universal Atlas Cement Co.; R. B. Fortuin of the Pennsylvania-Dixie Cement Corp; Lea Warner of the Warner Co.; E. W. Fitzgerald and M. P. Greer of the Marquette Cement Manufacturing Co., and Harvey S. Mowder of the Edison Cement Corp.

Wednesday Session

Cecil H. Fisher, manager of the storage and delivery section of Dupont, was the first speaker. Mr. Fisher's paper, entitled "Safe Handling of Explosives," contains so much information of value to quarrymen that permission has been obtained to present an abstract in a forthcoming number of Rock Products.

Lea P. Warner, Jr., industrial relations manager of the Warner Co., producers of stone and lime products, read a paper on "Effective Safety Work in a Heavy Industry" in which he described, with many excellent photographs, many of the accident prevention activities of his company. The Warner Company produces and processes sand, gravel and limestone, and also operates and maintains central mix concrete plants and delivery trucks and a river transportation fleet consisting of barges, tugboats and dredges.

"Our company," said Mr. Warner, "is too small to operate separate departments for safety, personnel, medical, employe publications and workmen's compensation, so we have combined all of these functions under the guidance of the industrial relations department.

"We are self-insurers for workmen's compensation and have accordingly our own system of physical examination, general medical procedure, accident reporting and cost analysis forms. Our total workmen's compensation costs, medical, physical examinations, x-ray examinations and department salaries amounted to one percent of the total company payroll during 1938. For 6 months of 1939 the total cost was 0.9 percent of the payroll.

"Monthly safety meetings are held at most of our locations to discuss hazardous conditions and the previous month's accidents. There are several methods of procedure for conducting these meetings. In one division, for instance, our marine superintendent acts as permanent chairman, and the general superintendent, regardless of seemingly more pressing duties, sits in with the safety committee. This group is made up of three plant and accident inspectors, who serve a term of three months, and one safety observer appointed from each department. The latter serve for a term of one month and wear badges indicating their authority to warn fellow workers of unsafe working methods, etc. In another division, two permanent safety committees of foremen and sub-foremen operate in competition with each other. In all company meetings, minutes are kept and a copy filed with the main office.

"All accidents are investigated and a signed report sent to me by the accident inspection committee. On lost-time or disabling injuries, a more thorough investigation is made, pictures are often snapped and *immediate* action taken to remedy the cause. In some cases we can only render first-aid to the situation until a final correction can be made at a later date."

The concluding paper on the program, "First-Aid for Quarry Workers," was presented by Dr. L. M. Thompson, assistant medical director of the American Red Cross. Its content is of such importance to quarrymen and the rock products industry in general that an abstract of Dr. Thompson's paper will be presented, with permission, in a later issue.

Human Error in Sampling

ARTICLE EIGHT

On crushing, sizing, testing and specifying of aggregates compares theoretical vs. actual grading

By ELWOOD T. NETTLETON*

SAMPLING of stone on the job is done in many places; such as, stock piles, aggremeters, off belt unloaders, out of railroad cars, barges, or trucks.

Usually it is more desirable to take samples out of cars or barges before unloading, in case the stone should not meet the requirements. Since car sampling of stone is quite the common practice, and inasmuch as this is probably the most difficult place to obtain fair samples, tests were run to see what the human error was in sampling railroad cars.

Checking For Errors

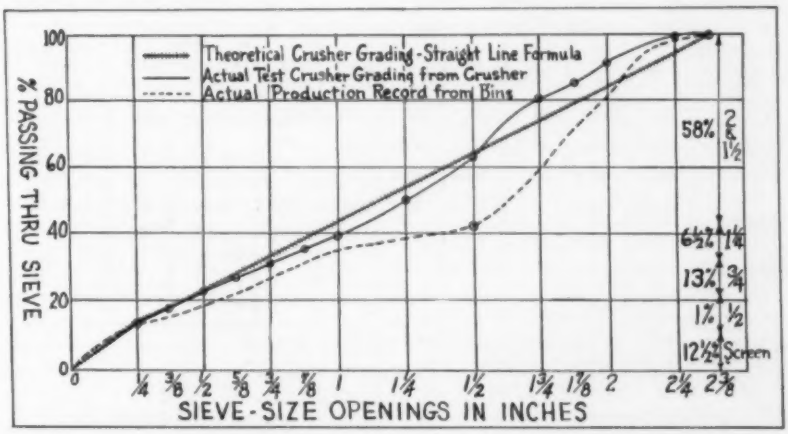
In this test, under the auspices of the writer and with the coöperation of the Connecticut State Highway Department, five people were employed: the first was an assistant resident engineer; the second, the chief inspector for the job; the third, an engineer for the producers; the fourth and fifth, inspectors on the job.

Each person selected, independently of the others, one composite sample for each car from three different cars. No one of the group witnessed or saw either the locations or the method of taking samples used by any of the others. They did know, however, that others were going to take check samples from the same cars, and, for this reason, used as much care, if not more, than was their usual practice for reasons which are quite evident.

Three cars of large, coarse aggregate for concrete, commercially screened between a 2¼ and 1-in. quarry screen, were sampled. It was considered that probably coarse graded stone, shipped in a V-bottom battleship type of car, presented the maximum in segregation during transportation, and consequently presented the most difficult conditions for field sampling.

Following this sampling, five samples of stone were taken also from the quarry chute at Plainville at various intervals, while three cars of stone were being loaded.

The divergent results speak for themselves and are more fully discussed later on in these articles. The maximum error in sampling on the job for any sample off the average was 18.5 percent; whereas, the maximum error for any sample out of the quarry chute was 7.4 percent, as shown in the table on the following page. The maximum divergence between any two samples was 31.1 percent on the job and 13.8 percent at the plant. Note—As a result of this test the Connecticut State Highway Department has recently adopted sampling of aggregates at the source of supply by a group of inspectors specially trained for this particular purpose.



Graph showing straight line formula and percentages of sizes revealed by tests

No. 7, NORTH BRANFORD—PERCENTAGES OF VARIOUS SIZES PRODUCED

	2¾ rd.-1¾, 1½ sq.	2-1½ sq.	1½-1 sq.	1-⅝ sq.	⅝ sq.-3/16x¾ in.	3/16x¾ in.-0
1936	2 in.	1½ in.	1 in.	¾ in.	½ in.	Screenings
May	28.3	31.2	4.8	12.1	13.4	10.2
June	25.3	33.0	6.6	12.2	12.3	10.6
July	20.9	37.0	7.2	12.2	11.9	10.8
August	22.6	37.6	5.9	12.9	10.0	11.0
September	18.3	35.9	6.2	15.9	11.6	12.0
October	19.1	36.9	5.9	14.8	10.5	12.6
November	21.5	38.0	5.5	13.3	9.3	12.4

	2¾-2 sq.	2⅛-1½ sq.	1½-1 sq.	1-⅝ sq.	⅝ sq.-3/16x¾ in.	3/16x¾ in.-0
1937	2 in.	1½ in.	1 in.	¾ in.	½ in.	Screenings
April	18.5	38.3	6.7	14.8	9.3	12.4
May	20.1	37.0	6.6	11.8	11.3	13.2
June	21.3	38.4	5.9	11.4	10.6	12.4
July	21.7	34.9	6.6	11.6	11.3	13.9
August	16.3	34.2	9.1	13.6	13.0	13.8
September	17.1	35.2	9.2	12.4	12.5	13.6
October	16.7	37.4	8.2	11.8	12.9	13.0
November	18.0	37.2	7.3	11.7	12.0	13.8

Percentages of Various Sizes of Stone Produced

Owing to conditions as explained in the previous section of this report, practically 95 percent of the lifting of samples was made by the writer in an attempt to eliminate the personal divergence or error in sampling as far as possible. Furthermore, it gave the writer the opportunity to make observations and keep notes as to actual operating, plant, and field conditions at the time.

* Engineering Director and Secretary, New York State Crushed Stone Association, Albany, N. Y.

COMPARISON OF THE HUMAN ERROR IN SAMPLING COARSE MIXED CRUSHED STONE BETWEEN SAMPLES LIFTED OUT OF RAILROAD CARS AND SAMPLES TAKEN FROM LOADING CHUTES OF QUARRY BINS

Sample and Test No. 23047 — Taken from R. R. Car

Sample Percent Passing	A	B	C	D	E	Maximum	Minimum	Max. Diff. between Tests	Average	Max. Diff. off of Tests
2½	100	100	100	100	100	100	100	0	100	0
2	99.4	97.8	100	96.5	97.8	100	96.5	3.5	98.2	1.8
1½	77.4	76.7	78.2	69.3	68.2	78.2	68.2	10.0	73.9	5.7
1	38.0	37.6	40.6	21.7	18.9	40.6	18.9	21.7	31.4	12.5
¾	15.3	15.0	18.7	5.6	4.5	18.7	5.6	13.1	11.8	6.9
½	3.3	1.5	4.3	0.7	0.7	4.3	0.7	3.6	2.1	2.2
¼	0.0	0.0	0.6	0.0	0.7	0.7	0.0	0.7	0.2	0.5

Max. diff. = 21.7 on 1-in. screen between any tests.
Max. diff. any test off average 12.5.

Sample and Test No. 161477 — Taken from R. R. Car

Sample Percent Passing	A	B	C	D	E	Maximum	Minimum	Max. Diff. between Tests	Average	Max. Diff. off of Tests
2½	100	100	100	100	100	100	100	0	100	0
2	97.6	100	99.3	98.0	97.8	100	97.6	2.4	98.6	1.4
1½	65.0	77.6	77.3	67.6	69.4	77.6	65.0	12.6	71.4	6.4
1	34.8	44.9	41.8	25.7	32.7	44.9	25.7	19.2	35.9	10.2
¾	15.6	23.9	22.0	10.8	17.8	23.9	10.8	13.1	18.1	7.3
½	3.6	7.9	7.0	2.7	4.5	7.9	2.7	5.2	5.1	2.8
¼	0.6	0.0	2.1	0.6	0.7	2.1	0.0	2.1	0.8	1.3

Max. diff. = 19.2 on 1-in. screen between any test.
Max. diff. any test off average 10.2.

Sample and Test No. 323343 — Taken from R. R. Car

Sample Percent Passing	A	B	C	D	E	Maximum	Minimum	Max. Diff. between Tests	Average	Max. Diff. off of Aver.
2½	100	100	100	100	100	100	100	0	100	0
2	97.5	99.3	100	98.7	97.2	100	97.2	2.8	98.5	1.5
1½	78.9	80.1	88.7	73.7	62.4	88.7	62.4	26.3	76.6	14.2
1	42.3	41.8	58.8	31.1	27.7	58.8	27.7	31.1	40.3	18.5
¾	19.8	21.9	36.2	12.1	14.9	36.2	12.1	24.1	21.0	15.2
¼	5.7	8.5	14.9	2.7	3.5	14.9	2.7	12.2	7.1	7.8
½	1.2	2.8	6.3	0.0	1.4	6.3	0.0	6.3	2.3	4.0

Max. diff. = 31.1 on 1-in. screen.
Max. diff. any test off average 18.5.

Samples for Test No. 61243 — Taken from Bin Chute

Sample Percent Passing	A	B	C	D	E	Maximum	Minimum	Max. Diff.	Average	Max. Diff. off of Aver.
2½	100	100	100	100	100	100	100	0	100	0
2	93.9	96.5	98.7	97.1	96.6	98.7	93.9	4.8	96.6	2.7
1½	70.0	76.3	76.5	73.9	78.1	78.1	70.0	8.1	75.0	5.0
1	36.5	38.2	34.9	28.9	42.7	42.7	28.9	13.8	36.3	7.4
¾	17.8	16.0	16.3	12.7	21.3	21.3	12.7	8.6	16.7	4.6
½	5.9	5.1	5.5	2.9	9.2	9.2	2.9	6.3	5.7	3.5
¼	1.9	1.7	2.3	0.6	3.9	3.9	0.6	3.3	2.1	1.8

Max. diff. = 13.8 on 1-in. screen.
Max. diff. any test off average 7.4.

For years, the generally accepted theory as to the various percentages of different size-products produced by a crusher was the straight-line formula. Expressed in other words, for the same differential in size opening between the passing and retaining screen, the percentage of the product would be the same. If stone were crushed from top size 2½ to 0, the percent of the product made between 2½ in. and 2 in. would be the same as the percent of the product from 2 in. to 1½ in., or from 1½ in. to 1 in., or for any like differential between top and bottom screen (½ in. differential in this particular example).

For various reasons it was quite evident that an actual test of the product of our crusher, at our largest quarry, would give us considerable information and also give us a check upon the straight line formula. Since these tests were run before we installed our testing machine, all screening was done by hand on small test screens. Although rather a laborious task, hand placing of stone was resorted to, so we believe that practically 100 percent efficiency was obtained. These results were plotted as shown in the graph on the preceding page, and the straight line formula was added for comparative purposes. Maximum deviation at any one point between the two was not over 7 percent in any case. This deviation appeared to be nearer the top of the graph.

In the past, the straight line formula has usually been applied with a dip or curve at the lower end, from ¼ in. down, which takes care of the dust percentage. As the result of this test, as well as many subsequent tests at all our quarries, the writer is quite convinced as to the difficulty of stone passing an aperture whose opening is the same or just slightly greater than the size of the stone itself. With this in view, it would appear that a flat curve should be applied at the upper end of the straight line formula as well as an abrupt curve at the lower end of this formula.

For the sake of comparison it was also thought that if the actual production of various sizes of stone could be obtained, further light might be cast upon the subject. With this in view, the actual records of various sizes produced at the same quarry, were obtained for a given period (see table on preceding page). The average percentages of the various commercial sizes were then plotted on the same graph. Unfortunately, there was overlapping of screen sizes in the two

(Continued on page 52)

Sand and Gravel Directors Discuss War and Business Prospects

By NATHAN C. ROCKWOOD

MEETING in Washington, D. C., in an atmosphere of neutrality talk and dire political predictions, the board of directors of the National Sand and Gravel Association, September 29 and 30, adopted a resolution which is doubtless typical of the sentiments of all sand and gravel producers and every other American business man as well. It reads:

"RESOLVED, by the Board of Directors of the National Sand and Gravel Association, assembled in meeting at Washington, D. C., on this the 29th day of September, 1939, that, in keeping with the sentiments of industry as a whole in the United States, the sand and gravel industry endorses the efforts of our government to preserve peace and to avoid our involvement in war; and be it further

"RESOLVED, that the National Sand and Gravel Association, acting for the sand and gravel industry, is prepared to coöperate with all agencies of government and with other organizations of industry in promoting and protecting our national policy of neutrality."

By an informal showing of hands, but two of this group of about a score of intelligent American business men would want to see our country involved in Europe's war under any conditions that might arise short of actual defense of our own shores, homes and firesides. Apparently that is a fair index of American public opinion today.

Considered from the selfish angle of this industry alone, as V. P. Ahearn, executive secretary, said, "It is recognized that involvement of the United States in war would probably mean at least the temporary elimination of all private business controls in this country. History reveals that once those controls have been assumed by government, they are rarely, if ever, surrendered when the emergency has passed. Industry, therefore, has a vital interest in the preservation of peace and the resolution adopted by the board is designed to make it clear that the sand and gravel industry, however much it might benefit in certain spots as the result of emergency conditions, is in complete accord with our national policy of neutrality."

National Emergencies; Labor Relations

A whole morning session was devoted to the subjects of national emergencies (so-called by President Roosevelt) and labor relations. Executive Secretary Ahearn outlined at some length (1) industrial mobilization under war conditions or threats of war; (2) efforts of C.I.O. to organize the building industry and retaliation by A. F. of L. through boycotts; (3) agreement between the Associated General Contractors and the American Federation of Labor to eliminate jurisdictional disputes; (4) changes effected in the amended Social Security Act, particularly as they apply to sand and gravel producers using navigable waters for production and transportation; (5) Wage and Hour Act interpretation of the definition of seamen; (6) possible changes in the Federal Revenue Laws.

The subject of labor relations was made very much alive by the threatened strike in Washington, D. C., because of a jurisdictional dispute between the locals of the operating engineers' union and the teamsters' and chauffeurs' union over which should control delivery of ready-mixed concrete in the District of Columbia. The officers of the local chauffeurs' union have since been indicted, as noted in a news story elsewhere in this issue. This particular case is not of very great significance except as an example of jurisdictional disputes between unions within the A. F. of L. In most cities members of the chauffeurs' union drive the trucks; in the District of Columbia it so happens the employers have a contract with members of the operating engineers' union to drive trucks.

In these controversies, whether between A. F. of L. unions or between A. F. of L. and C. I. O., the employer has no recourse under the law as at present interpreted. If, for example, a ready-mixed concrete producer in the District of Columbia, in order to continue deliveries, fired his engineers' union drivers and employed chauffeurs' union men, he doubtless would render himself liable to being hauled before the so-called National Labor Relations Board and made to reinstate his old drivers with all back pay plus penalties. The indictments referred to, for alleged violation of the Sherman anti-trust laws, are not a solution of the general problem in which the building material industry finds itself, although if a policy of attacking genuine labor racketeering is honestly and courageously followed through it may prove helpful.

E. J. Harding, managing director, Associated General Contractors of

COMING CONVENTIONS

Chemical Exposition, Grand Central Palace, New York City, December 4 to 9.

National Sand and Gravel Association and National Ready Mixed Concrete Association, Hotel Jefferson, St. Louis, January 17, 18, and 19.

National Crushed Stone Association, Hotel Jefferson, St. Louis, January 22, 23, and 24.

American Road Builders and Road Show, Chicago International Amphitheatre, Chicago, January 29 to February 2.

National Concrete Masonry Association, National Cinder Concrete Products Association, and Cast Stone Institute, Mayflower Hotel, Washington, D. C., February 12, 13, and 14.

America, as an invited guest, described to the members of the board the progress made in attempting to eliminate jurisdictional disputes and useless but costly strikes on construction jobs. The interesting thing is that union and employers' groups are beginning to respect each other's point of view.

It was subsequently agreed by the board that National Sand and Gravel Association should continue its services to member companies in the field of labor relations inaugurated two years ago, and a labor relations committee was appointed by President Hill as follows: Alexander Foster, Jr., chairman; Paul P. Bird, Charles M. Cadman, Otto S. Conrades, Anderson Dana, J. Rutledge Hill, Robt. E. O'Connor, John Prince, George W. Renwick and Ray V. Warren.

Federal Legislation

In addition to the foregoing subjects, under the leadership of Executive Secretary Ahearn, the following came in for discussion: (1) determination of wages for the industry under the Walsh-Healey Act—report on the public hearings to be called; (2) status of the association's application for recognition of the industry as a seasonal one, under the terms of the Wage and Hour Act; (3) government competition with the industry; (4) investigation of the building industry by the U. S. Department of Justice; (5) proposals to amend the anti-trust laws.

One of the most serious difficulties the industry is contending with at the moment is the status of employes who work on dredges and scows on navigable waters. The difficulty arises over the definition of "seamen," who, as a class, do not come under the provisions of the Wage and Hour Act. According to Interpretative Bulletin No. 11 of the Wage and Hour Act administrator certain employes who are defined as seamen under the Social Security Act are not seamen under the Wage and Hour Act.

An afternoon session of the board was devoted to an informal report by Stanton Walker, director of engineering, who had as guests H. Herbert Hughes, U. S. Bureau of Mines, S. S. Steinberg, dean of engineering,

1—J. Rutledge Hill, president and chairman of the board of directors, and V. P. Ahearn, executive secretary
2—Charles M. Cadman and Alexander Foster, Jr.
3—B. V. Hedrick
4—F. P. Spratlen, Jr., H. Herbert Hughes (U. S. Bureau of Mines, guest), and Fred P. Curtis
5—H. P. Caldwell
6—Otto S. Conrades
7—Daniel J. Miller
8—Anderson Dana

University of Maryland, and M. Cedric Gleason, of the association's research staff. Mr. Walker discussed the coöperative agreement between the University of Maryland and the association which led to the establishment of the National Sand and Gravel Association Research Foundation. He emphasized the cordial relationship which existed between the association and the university and spoke most highly of the coöperation afforded by the university. Dean Steinberg also spoke on this point and expressed the satisfaction of the university with the coöperative arrangement.

Engineering and Research

Opportunities for research in fields of interest to the industry through the establishment of fellowships were outlined and Dean Steinberg described the conditions under which fellowships might be established to satisfy the requirements for advanced degrees. The matter of establishing such a fellowship was referred to the association's research committee of which A. W. Dann is chairman.

Mr. Walker discussed at some length current investigations of chert, the adhesion of bitumen to aggregates, abrasion and soundness tests of aggregate and a number of miscellaneous tests, trends in specifications, some production problems and, in particular, the simplified practice program for sizes of coarse aggregates. Since his discussion was of the nature of a progress report, no action of the board was required. However, numerous questions and comments indicated the interest of members in the engineering activities.

Mr. Walker presented to the board for decision a request from the National Concrete Masonry Association that the National Sand and Gravel Association assist in financing fire tests of concrete building units to be carried out at the National Bureau of Standards. After thorough discussion, it was developed that it was the consensus of the board that the tests proposed could not feasibly cover a sufficiently wide range in gravel to make them of interest to the industry. It developed in the discussion that the program called for the use of only one gravel, and that with a silica content of less than 60 percent. While a number of the members of the board indicated that they furnished materials for the manufacture of concrete block and tile, none of those present produced a gravel which would fall in that category. Accordingly, the board decided not to coöperate in the tests.

The following members and guests attended the Washington meeting: V. P. Ahearn, executive secretary; Paul P. Bird, Boston Sand and Gravel Co., Cambridge, Mass.; J. Fennell Berger, John A. Roebling's Sons Co., Trenton, N. J.; W. A. Bliss, Dravo Corp., Keystone Sand Division, Pittsburgh, Penn.; Chas. M. Cadman, Pacific Coast Aggregates, Inc., San Francisco, Calif.; H. P. Caldwell, Ohio River Sand Co., Louisville, Ky.; Otto S. Conrades, St. Louis Material and Supply Co., St. Louis, Mo.; Fred P. Curtis, Lyman-Richey Sand & Gravel Corp., Omaha, Nebr.; Anderson Dana, Seaboard Sand and Gravel Corp., New York, N. Y.; Alexander Foster, Jr., Warner Co., Philadelphia, Penn.; Floyd C. Fuller, the Portsmouth Sand & Gravel Co., Portsmouth, Ohio; B. V. Hedrick, B. V. Hedrick Gravel & Sand Co., Lilesville, N. C.; J. Rutledge Hill, Gifford-Hill and Co., Inc., Dallas, Tex.; Daniel J. Miller, Portland Sand & Gravel Co., Portland, Penn.; H. V. Owens, Eastern Rock Products, Inc., Utica, N. Y.; S. A. Phillips, *Pit and Quarry*, Chicago, Ill.; J. P. Eyre Price, Wyoming Sand & Stone Co., Scranton, Penn.; Nathan C. Rockwood, ROCK PRODUCTS, Chicago, Ill.; L. W. Shugg, General Electric Co., Schenectady, N. Y.; F. P. Spratlen, Jr., Spratlen-Brannan, Inc., Denver, Colo.; H. H. Stewart, J. K. Davison & Bro., Pittsburgh, Penn.; Stanton Walker, director of engineering; Irving Warner, Warner Co., Philadelphia, Penn.

Industrial Sand Producers Expect Prosperity

OPTIMISM for the next year's outlook predominated at the semi-annual meeting of the Board of Directors of the National Industrial Sand Association in Chicago, Ill., October 20. Seventeen representative producers of industrial sand were present from all parts of the country except the West.

V. P. Ahearn, executive secretary, first sketched the history of the association's efforts to obtain recognition of the industry as a seasonal one under the Federal wage and hour law. The board decided to suspend any further effort pending the outcome of the sand and gravel industry's case.

The executive secretary then reported on the association's part in the formation of the New York State code. The code now covers rock drilling only, but regulations have been prepared to cover rock crushing. The important factor is the definition of injurious dust concentrations. A code has also been prepared for the ceramic industry. No standard method of dust counting has been adopted. New Jersey producers are seeking to have a code covering silicosis adopted in that state.

Mr. Ahearn touched on the possibilities of Federal legislation along similar lines. This can be accomplished by means of financial assistance grants to states which adopt codes after a Federal pattern. Some such legislation, he thought, was almost certain. Other subjects covered by the executive secretary, were similar to those in his talks to the board of directors of the National Sand and Gravel Association, given elsewhere in this issue.

Stanton Walker, reporting as consulting engineer of the association, outlined the activities and accomplishments in reviewing and helping to revise tentative standards of the American Foundrymen's Association. The board authorized continuation and extension of the work, which will develop variations in tests due to differences in screens and other factors that specification writers seldom take into account. The board voted to invite Dr. H. Ries, Cornell University, technical adviser of the American Foundrymen's Association, to become a member of the sand research committee.

Adopt Neutrality Resolution

The board voted unanimously to adopt a resolution endorsing the Federal Government's stand on neutrality, similar in wording to that adopted by the National Sand and Gravel Association and printed elsewhere in this issue.

Producers present were: E. M. Ayers, Zanesville, Ohio; E. J. Beyer, Rockwood, Mich.; J. S. Cable, Akron, Ohio; E. M. Durstine, Columbus, Ohio; L. M. Hansen, Youngstown, Ohio; R. G. Hay, Zanesville, Ohio (President); C. M. Hardy, Evansville, Ind.; A. S. Hindman, Chicago, Ill.; P. S. MacDougall, Ottawa, Ill.; C. Mathiesen, Albany, N. Y.; Alfred T. Miller, New York City; John T. Putnam, Oregon, Ill.; Ralph L. Stevens, Cape May, N. J.; J. M. Strauss, Morgantown, W. Va.; G. M. Thornton, Ottawa, Ill.; A. Warsaw, Chicago, Ill.; W. J. Woods, Lewistown, Penn.

Hints and Helps

★ FOR SUPERINTENDENTS ★

Poke Holes For Dislodging Material In Clogged Bins

IN ORDER to break down any arching or to dislodge clogged material lodging in the throat of the feed bin Yosemite Portland Cement Co., Merced, Calif., has fitted the bin with poke holes as shown herewith.

Arching or clogged material in feed bin broken up by poking through pipes

The arrangement, which has been in successful use for some time, consists of short pipes projecting into the bin throat so that a rod may be poked through, but long enough to prevent material from flowing out. This bin contains clinker, which is weighed out for mill feed.

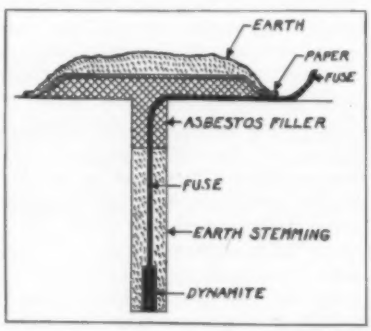
Sound Control In Blasting

REDUCTION OF NOISE in blasting is often very desirable, and any practical method to this end should be useful to the rock products industry. In the June, 1939 issue of *Asbestos*, F. R. Cozzens describes and illustrates a method of controlling sound which was used in removing a 60-ft. ledge of grey standstone in building a highway near Pomeroy, Ohio.

Holes were drilled into the ledge, 8 ft. deep and 4 in. in diameter, and loaded with four 1¼- x 8-in. cartridges of 60 percent strength gelatin dynamite. After a 2-ft. stemming of earth, certain of these holes were filled with short fiber asbestos which was allowed to extend in a layer 1 in. in thickness above and around the top of the hole for a distance of 3 ft. The asbestos fiber was then covered with a double thickness of heavy paper, and a few shovels of earth were scattered over the top to hold the packing firmly in place. A length of fuse, connecting with the explosive, had previously been drawn up through the hole, its exposed end being anchored near the outside edge of the paper. Charges were fired both singly, and in series of three.

Advantage was taken of the fact that blast noise originates at the mouth of the shot hole when pressure pulsations hit the atmosphere, and the asbestos fiber, through its numerous dead air spaces would tend to muffle these pulsations. It is claimed that this method was so effective that patients in hospital wards less than 200 ft. away were not disturbed. Hospital attendants reported hearing only muffled jars, and estimated that noise was 40 to 60 percent less than from blasts not treated. About 20 minutes more time is required to treat a blast hole for sound control, and the additional cost is reported to average 55c per hole.

In certain blasting operations, asbestos products are being utilized in both noise and vibration control. Treatment is applied by casing the blast hole from top to bottom with aircell pipe covering. Three-foot sections, 3-in. diameter (measured inside) are generally specified, and the explosive is lowered down through the casing to the bottom of the hole. After the required amount of earth filling has been poured in, the remainder of the casing is filled to above the top and around it with short fiber asbestos, then covered with paper as previously explained. Firing is done either by fuse or battery as conditions require. Holes treated in this manner require an average additional cost of $1.20 for the asbestos aircell casing.



Showing method of applying asbestos in combatting sound in blasting

Road Drag Made From Screen Section

MAINTENANCE work is frequently very necessary on the roadways around crushed stone operations and gravel plants where a considerable amount of material is trucked out. However, such work is frequently left undone because the company does not have the proper equipment for maintenance. A very simple road drag can be made.

All that is necessary is to flatten out a discarded section of a revolving screen, and bolt a strip of iron along each edge, as shown in the illustration, to provide weight and rigidity. With a chain attached to one edge of this drag, it can be pulled over the road behind a truck and will effectively smooth out the rough places. The edges of the drag and the sides of the perforations plane off the high places and carry the dirt along to the low spots.

Discarded screen can be made into an efficient road drag

When a road is very rough, it is sometimes advisable to fasten the chain to two points on the side of the drag, instead of at the end, so that the drag is pulled crossways of the road. It is even better to attach the chain so that the drag is pulled at an angle in order that the front edge will shear off the dirt instead of merely pushing it in front. The best results are obtained when a man rides on the drag, as his weight will aid materially in cutting high spots.

Estimating Absorption of Fine Aggregate

CERTAIN ROUTINE TESTS of sands may be greatly expedited if the absorption can be determined accurately enough in considerably less time than that required by the A.S.T.M. Method C-128-36 T. Horace A. Pratt of the Maine Technology Experiment Station recently described three quick methods in Bulletin No. 35.

As a result of investigations of 60 Maine sands the author has arrived at the conclusion that a reasonably satisfactory prediction equation based upon the joint influence of various physical characteristics of the sands upon the absorption can be derived, the use of which will obviate the necessity of making the regular absorption tests on sands.

Although an equation derived for Maine sands would not necessarily apply to the sands of other localities, still the same method would apply and a similar equation could be prepared from a like study of the sands of any region.

In particular, this study indicates the following facts:

The amount of water a sand will absorb may be estimated by any of the three following equations:

(1)—Estimated per cent absorption = 1.45 — 0.0147 (per cent granitic) + 0.3242 (fineness modulus)

(2)—Estimated per cent absorption = 3.07 — 0.0143 (per cent granitic) + 0.0005 (surface area)

(3)—Estimated per cent absorption = 1.72 — 0.0148 (per cent granitic) + 0.0105 (per cent retained on 28-mesh sieve)

Practically no differences exist between the respective multiple correlation coefficients, the standard errors of estimate, or the percentages of variation controlled. This indicates that equally satisfactory results may be obtained with each of these formulas.

The small differences which are present slightly favor Equation 2 for prediction purposes.

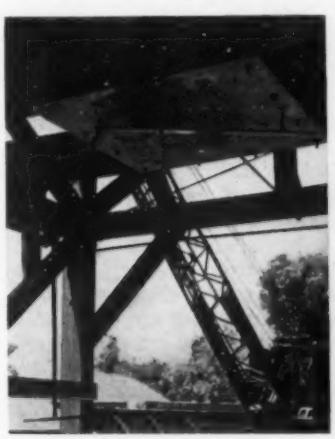
The chances are fifty-fifty that the percent of water a sand will absorb will be within 0.34 of the estimated value predicted by Equation 2.

Easily Operated Bin Gate

By H. L. SULLIVAN
Supt., San Gravel Co.
Paducah, Ky.

HEREWITH are two illustrations showing a simple arrangement for opening and closing bin gates, so that truck drivers can load their own trucks. The gates are the usual horizontal plate cut-off type, customarily operated from a platform near them or from ground level levers near the centers of the sides of the bins.

The materials necessary to make the new device for each bin consist of about 4½ ft. of ½ x 2-in. flat iron or steel bars for levers, 22 ft of ⅜-in. wire rope, one small turn buckle, a small drum on the end of a 1-in. pipe. On the lower end of this 1-in. pipe was welded a short piece of ¾-in. round bar to turn the pipe and the drum. The pipe with the drum is located in a corner of the bin where it is near the truck cab. The other structural details are readily understood from the pictures.



Two views of simple arrangement for operating bin gates. By means of cable control a turn of the handle shown in view to the left opens or closes the gate

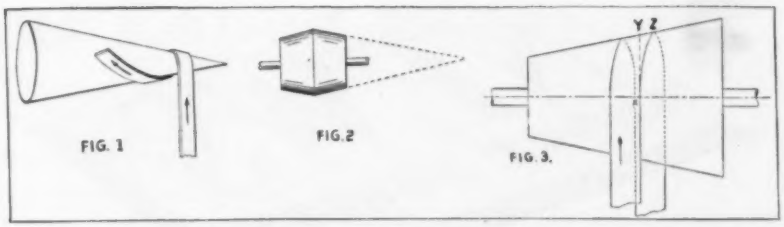


Fig. 1: Demonstrating with paper cone to show how belt has a tendency to wind toward larger end. Fig. 2: Two cones placed together at ends show development of pulley. Fig. 3: Analytical method of explaining action of belts on pulley

Why Does Belt Run To Large Diameter?

By W. F. SCHAPHORST, M.E.

BY MAKING A CONE out of an ordinary newspaper as sketched in Fig. 1, and cutting a straight strip of paper, which in this experiment will serve as a belt, it is easy to demonstrate why belts always run toward the large diameter.

Rotate the cone as though it were a pulley and as though it were pulling the belt on itself in regular belt fashion. It will be found that the tendency of the belt is to wind around the cone in the direction indicated by the arrows. In other words the invariable natural tendency of the strip of paper is to wind very rapidly toward the large end of the cone, which is the equivalent of a belt running toward the high side of the pulley. No matter how this simple experiment is tried, by either winding the strip frontwards or backwards, it will be found always to wind toward the large end.

The performer of this experiment will also learn *why* the belt acts as it does—because the belt is stiff and the curvature of the cone is such that it *directs* the stiff belt toward the large diameter. Even if the belt is purposely aimed toward the small diameter, it won't go there; it will move in only one direction—toward the large diameter.

In an exaggerated way, with the addition of dotted lines, Fig. 2 shows the conical shape of one-half of an ordinary pulley. Since the tendency of the belt is always to run toward the high side, or large end of a cone, it is plain that by placing two cones base against base, as in Fig. 2, and running a belt on either one of the cones, the belt will move toward the greatest diameter, and after getting there it will stay there.

By cutting off the peaks of the cones as indicated in the sketch, and reducing the exaggerated slope, a standard crowned pulley is the result. This therefore explains both why pulleys are crowned and why a belt always runs toward the large diameter. In fact (and here is an argument against the use of belts that are too wide and thin), there are cases on record where wide, thin belts, running on pulleys of high crown, have climbed up the cones with such force as to fold the belts in the middle upon themselves.

An explanation that is somewhat more analytical is shown in Fig. 3. On going upward the belt first makes contact with the cone at X. If the pulley were truly cylindrical the point X would, of course, move to Y. But on account of the conical shape of the pulley and the stiffness of the belt it actually goes to Z and follows the dotted lines on the other side.

A. K. HUMPHRIES has been elected president of Pacific Coast Aggregates, Inc., San Francisco, Calif., to succeed Charles M. Cadman, who has resigned. E. J. Goodpaster, formerly assistant general manager, has been appointed vice-president, general manager and director.

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WILLIAM A. RIGGS, assistant chief engineer of the South American Development Co. at Portovelo, Ecuador, has accepted employment with the engineering department of the Pittsburgh Limestone Corp. He will be located in the operating offices at New Castle, Penn.

•

C. E. KLAUS, formerly general superintendent of the Columbia Quarry Co., Columbia, Ill., is leaving the country soon to open a quarry and crushing plant for the Firestone Tire & Rubber Co. at Monraira, Liberia, West Africa, to produce crushed stone for dam, power house foundation and roads.

•

KAI THUESEN of Compania De Cementos Portland Diamond, Apulo, Cundinamarca, Columbia, has been touring the United States with his wife. The unfamiliar Cundinamarca license plate on his auto has aroused interest wherever he has visited. Compania De Cementos Portland Diamond is a wet process plant with two kilns and an annual output of 108,000 metric tons.

•

E. H. DAVIS has been elected president of the reorganized Superior Cement Corp., Portsmouth, Ohio. He was formerly secretary of the company. The board of directors also elected H. H. Moore, formerly assistant secretary and treasurer, as secretary and treasurer.

•

LEE S. TRAINOR, formerly construction engineer of the National Lime Association, has moved with his family from Braddock Heights, Md., to his earlier home in Beardstown, Ill. In spite of the fact that he has been incapacitated for a long time—since February 22, 1938—Mr. Trainor reports that he is gaining strength and feeling fine. He sends his greetings to his many friends in the lime industry and expresses his desire to see any of them who may be in the vicinity of Beardstown at any time.

•

W. H. HITZELBERGER has been appointed as district highway manager for the Portland Cement Association in Texas. From 1939 to 1938, he was vice-president and sales manager of the Reliance Clay Products Co., Dallas, and more recently operated his own company engaged in the sale of highway materials and equipment. E. N. Gustafson, formerly assistant district engineer, has been made district highway engineer of the P. C. A.

•

J. Z. HOLLMANN has been appointed manager of the Cleveland Division office of the Celotex Corp., to succeed George J. Dinges, who has been transferred to the recently opened Atlanta Division office as manager of the southern branch. Mr. Hollmann has been associated with the company since 1926 and formerly served in an executive capacity at the home office.

•

V. E. FRYE, superintendent for Nevada Rock and Sand Co., Inc., Reno, Nev., is supervising construction work on 7.6 miles of highway grading and surfacing from Carson City, Nev., east.

•

WILLIAM A. KIPP, safety director at the Leeds, Ala., plant of Universal Atlas Cement Co., is chairman of the Leeds campaign organization for the annual appeal of Birmingham and Jefferson County's Community Chest.

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R. E. VARNER, vice-president and general manager of the Uruguay Cement Co., and his wife recently visited the United States.

•

LESTER MERRITT has been appointed a safety engineer on the staff of the Industrial Commission of Ohio to specialize in the investigation, control, and elimination of dust hazards. Mr. Merritt is a graduate in ceramic engineering of Ohio State University, and has had a number of years of practical experience in that engineering field and in laboratory work.

•

O. N. LINDAHL, secretary and comptroller of the Universal Atlas Cement Co., New York, N. Y., has been elected president of the Controllers Institute of America at its annual meeting held in New York, October 9 and 10.

•

O. H. SEEGER has been appointed Columbus, Ohio, sales-service engineer of Southwestern Portland Cement Co., to succeed Floyd F. Green, who resigned to devote all his time to campaign for mayor of the City of Columbus.

•

B. L. BUSSE has been placed in charge of operations of the new Green Bay, Wis., packing plant of Universal Atlas Cement Co. He was formerly at the company's Milwaukee packing plant.

•

HENRY H. JONES, manager of the Rock Asphalt Co. of Utah, Sunnyside, Utah, has an interesting hobby. He is a bird fancier, raising all kinds of game birds, pigeons, peacocks, etc.

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R. O. KLOTZ, formerly with Certain-Teed Products Corp., at Blue Rapids, Kan., is now with the Kansas Industrial Commission.

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H. S. VAN SCOYOC, advertising manager of the Canada Cement Co., Ltd., Montreal, has been re-elected president of the Technical Advertisers Association of Montreal. Other officers re-elected are: vice-president, F. A. McLean, Canadian Ingersoll-Rand Co., Ltd., Montreal; secretary, A. P. Darcel, Canadian Ingersoll-Rand Co., Ltd.; treasurer, Thomas Hart, Jeffrey Manufacturing Co., Ltd., Quebec.

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C. L. MONTGOMERY, superintendent of the Vermarco Lime Co., West Rutland, Vt., is doubling, when the occasion arises, as fire chief of the West Rutland fire department. Recently he and 11 members of his force worked an hour and a half to quell a $2000 fire at the Vermont Marble Co. tie-in station.

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W. J. HASTIE, JR., has leased the Penfield gravel pit, north of Liscomb, Iowa and has started operations. Curtis March, who was employed by the late Mr. Penfield, is in charge of the pit and John Rudy is engineer.

(The obituaries appear on page 73)

Lime Plant Labor Economy

Stepping up efficiency of medium sized plant will permit profitable operations, stop further concentration in fewer units, and save jobs for labor

By VICTOR J. AZBE

NO ONE wants to see unemployment, and every man is entitled to a job that he should efficiently perform for a fair commensurate pay. To see men wanting work but not having any, is one of the saddest sights of the present industrial era. This is not brought on by the desire of the employer to deprive men of work, but rather by the competitive battle for survival between the different units of any one industry. Managements find it difficult to meet this situation. If they do not practice labor economy, they soon feel the effects through inability to compete with more aggressive producers. Eventually the impotent struggles for existence become plainly hopeless, the plant shuts down, and the men lose their jobs. It would have been far better if labor economy had been practiced, even though some would have lost their jobs, as most of the men would then have been retained.

Future of the Medium Sized Lime Plant

Although the writer is mainly interested in the lime industry he will admit that there are too many lime plants. At the same time, he also dislikes the present tendency to too great a centralization of production. The trend today, on the part of a few, is to put in one rotary kiln, then another and still another in the effort through large production to make the lime cheaper than anyone else and by this means to wipe out all competition. Most small plants today just struggle along under the dictation of the large units, and unless there is a radical change, this condition will not get better but worse. Unless the more progressive, medium size producers realize the drift and correct their ways accordingly, then eventually most of the lime will be made in about a dozen plants. Such centralization is not desirable. The writer would have as little sympathy with such a state of affairs, as he had with that prevailing in the past when the most inefficient, one- and two-kiln plants, operated by just anyone, made it go. That was possible through industrial under-development, but neither do we want industrial overcentralization. After all, this is a democratic country, and we do not want all to become regimented automats.

Comparative Labor Costs

To bring out the point further, we can resort to some comparisons, although comparisons are not always fair to the management of the plant that shows up poorly, as conditions very often prevail that are difficult to control. However, this situation is taken into account, and if any of the poor plants could not reach the maximum efficiency, they at least could come very close to it.

LIME FORUM

Mr. Azbe is a contributing and consulting Editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

The first example is a plant producing 65 tons of lime with a daily crew of 2 foremen, 8 firemen, 14 pitmen, 1 top man and 1 bin man, in all 26 men, at a cost of $111.77 or $1.71 per ton.

This example is compared with another plant producing 140 tons of lime with two working foremen, 3 firemen, 3 lime sorters, one man only to charge kilns, and some other help, but in the aggregate, only 9 men. This is a startling contrast, indeed, with only one-third of the labor for twice the production with a cost comparison of $1.71 to 30c, and the men are in no sense overworked.

For the difference of $1.40 per ton one could build a new plant twice over and still have plenty to spare, and the labor saving would not be the only advantage as other economies would be realized from a new plant.

Carrying comparisons further, why should one lime plant producing 3000 tons of lime per month and about 15,000 tons of crushed stone, require 55 men, from the quarry face to the superintendent's office, and another plant producing also 3000 tons but having no crushed stone market require over a hundred, and this latter plant is not an exception either but conforms more to the rule?

The writer always has stressed fuel economy in lime plants, and it is very important, but labor economy is even more so and while many lime plants are at fault as to fuel efficiency, many more are deficient with respect to labor economy.

A standard representing the best practice would require about a half hour of labor for charging, firing, drawing of kilns and sorting, crushing and loading of lime. However, this is very exceptional as labor per ton of lime varies widely in different plants. How high it can go is revealed by comparing the performance of four plants all now in operation. The best requires only 0.48 and others 1.2, 2.2 and 3.45 hrs. per ton of lime for kiln and lime shed labor, and in the last and worst case there was no special handling involved.

The contrast between 0.48 and 3.45 is so great that the latter plant would have no chance of competing with the first if it was anywhere near the other's territory. Competitive advantages ordinarily are on very small margins. For example, in one locality having a number of plants, if one plant would drop the cost of producing lime a mere 25c that would practically eliminate all competitors and load the plant to the limit of capacity, and 25c represents only half an hour of labor cost per ton.

The best plant in the above series of four has a labor cost of 30c per ton of lime, while the worst has $1.81, eliminating quarry, office and shop costs, and for the same degree of lime handling and both are vertical kiln plants.

Economies Pay For New Plant

With some local fluctuations, an hour of labor per ton equals about 50c, while good, highly efficient vertical kiln lime plants can be built for

between $400 and $600 per ton of daily capacity or an overhead figure of about 20c a ton. The difference between 20 and 50 represents a gain of 30c in profit per ton of lime. To save one hour of labor per ton of lime, one is justified in building an entirely new plant and completely scrapping the old.

Highest labor efficiency is so interwoven with kiln design, that while labor can often be reduced, the reduction can never be as great unless the kilns are of a type that can be operated with the minimum of attention and arranged for semi-automatic charging and bulk drawing. While gearing the kilns to high labor economy, improvements can often be incorporated that also increase fuel efficiency, so the gain is two-fold.

In this struggle, the vertical kiln plant still has a wonderful chance, and need in no respect fear the rotary. Properly designed, it is far cheaper to operate in fuel cost, and plants are now in existence which prove that with regard to labor they can be equally efficient, while as to investment, all comparisons favor the vertical plant.

We also need have no fear for the medium size plant, where the management knows its cost of production and the full possibilities of lowering it to bring it to par or better with the pace-setting rotaries. In fact, the medium sized, modern plant which is free from parasitical growth and streamlined for high duty performance is predestined to command the future markets.

The shovel and the wheelbarrow are incompatible with the American idea of progress as well as American standard of living. What raised the standard is mechanization and what causes unemployment is not mechanization, but too slow adjustment. With shovels and wheelbarrows as our tools, we all would still be working from dawn till dark to make just a bare living without being able to enjoy any of the luxuries that everyone now considers essentials.

The movement is on and it is irresistible, nothing can stop it, and any lime plant where the tool is the shovel and the wheelbarrow, unless it is blessed with some unusual advantage, is doomed.

Vacuum Cleaning Applications in the Rock Products Industry

REMOVAL OF DUSTY CONDITIONS in all plant operations in the rock products industry is engaging the attention of engineers and management throughout the country. Along with permanent dust collector installations at sources of dust generation, vacuum cleaning systems also are finding increasing use to remove dust from floors, walls, and inaccessible locations around motors and machinery.

Vacuum-cleaning electrical equipment in a silica crushing plant

The Spencer Turbine Co., Hartford, Conn., has developed both stationary and portable vacuum cleaning equipment for the rock products industry. In the accompanying illustrations are shown workmen cleaning floors and the motor and electrical equipment operating crushing equipment at the Central Silica Co., Glass Rock, Ohio. Vacuum cleaning systems also have been installed for the removal of dust in graphite, slate, lime, and limestone processing operations.

Equipment in the Spencer stationary vacuum cleaning system consists of a motor operated vacuum producer, a separator and a piping system leading to vacuum inlets conveniently located in all parts of the building. The producer is of the multi-stage turbine type, but differs from other types in that it has been designed with extra wide clearances throughout, making it particularly adaptable for vacuum cleaning. Impellers are made of copper bearing sheet steel or high tensile strength aluminum alloy. It is possible to use several impellers in series to obtain any desired volume and vacuum with low peripheral speeds. According to the manufacturer, the vacuum remains constant regardless of changes in volume.

A centrifugal separator without moving parts is used to collect the dirt, a collection efficiency from 95 to 98 percent being claimed, and the remaining fine dust is discharged through the exhaust outside the building. However, where the exhaust goes back into the room as on a portable vacuum cleaning system or where an excessive amount of abrasive materials are to be handled, a secondary or bag separator is recommended.

Workman removing dust from floors in silica plant with vacuum cleaner

Fluxes In Cement Mixes

Troubles attributed to fluxing agents may be due to improper grinding or mixing, to bad flame control or to highly fusible coal ash

By S. E. HUTTON*

CONSIDERABLE INCREASE in kiln capacity, clinker grindability, cement strength, and fuel economy, brought about by adding iron ore or slag to a normal cement mix and credited to iron oxide as a flux, was reported in ROCK PRODUCTS May 26, July 7, and September 1, 1928 by Alton J. Blank. Ring and coating troubles were less with the high-iron mixes. Among the numerous analyses given, the following are typical:

Analyses (Blank)	No. 2 Normal	No. 2 Iron Ore	No. 1 Slag
SiO_2	20.90	19.20	20.20
Al_2O_3	7.74	7.41	6.15
Fe_2O_3	2.90	4.59	5.35
CaO	64.54	64.84	64.70
MgO	2.19	2.17	2.18
SO_3	0.56	0.58	0.51
Ign. Loss	0.40	0.38	0.32
Total	99.23	99.15	99.41

Iron oxide as a fluxing agent is less favorably viewed by Katsuzo Koyanagi (ROCK PRODUCTS, May 10, 1930, p. 82) who credits alumina with greater fluxing value. In the table below one sample of a normal cement is compared with one of increased iron content, and another similar sample of normal cement is compared with a cement with increased alumina content. The following are typical analyses. Variations in the ratio of alumina to iron oxide are well within the ranges commonly experienced in normal operations in some plants.

This conflict of opinion is of sufficient interest to warrant some study of the data furnished. Possibly fluxing is only one, and perhaps not a very important one of the numerous influencing circumstances. One important bit of information, namely, free lime—is missing from each analysis. Actual fineness of some components of the raw mix, and of the finished cement is important. Unfortunately data of much value on fineness are unobtainable. The calculated potential constituents of the cements referred to are given in the following table. Free lime, which is always present whether pats are unsound or not, would reduce the percentage of tricalcium silicate.

CHEMIST'S CORNER

Problems and practices of the chemists in the industry are discussed on these pages. Contributions and comments are invited.

Potential Constituents	Blank's Cements: No. 2 Normal	Blank's Cements: No. 2 Iron Ore	Blank's Cements: No. 1 Slag	Koyanagi's Cements: No. 1 Original	Koyanagi's Cements: No. 4 High Iron	Koyanagi's Cements: No. 1 Original	Koyanagi's Cements: No. 3 High Iron
C_4AF	8.82	13.95	16.26	8.48	11.52	8.09	7.39
C_3A	15.58	11.84	7.23	10.12	8.03	10.47	13.97
C_3S	46.15	60.07	59.34	55.92	60.11	51.12	51.32
C_2S	25.17	9.79	13.21	20.84	16.11	25.41	22.11
$CaSO_4$	0.95	0.95	0.87	2.01	1.75	2.01	1.92
MgO	2.19	2.17	2.18	1.49	1.36	1.17	1.70
Ign. Loss	0.40	0.38	0.32	0.83	1.13	1.46	1.06
	99.26	99.15	99.41	99.69	100.01	99.73	99.47

Assuming that Mr. Blank's cements were reasonably similar in free lime and fineness, the higher strength in the "high-iron" samples could be accounted for by the increase in the tricalcium silicate content. Insofar as alumina and iron are concerned, whether they are considered in terms of oxide components of the raw mix or as the calcium compounds formed from them, their total and probably their fluxing values do not vary greatly. Magnesia is also quite uniform. In any case the temperature at which liquid formation begins is independent of the proportions in which compounds are present.

Reduction in fuel requirements and increase in kiln output could easily be a matter of flame distribution. That and alkalies in the raw mix would be significant in connection with coatings and rings, although soda reduces fusing temperature but little. Making snowballs is not a matter of chemical composition but one of physical condition of snow. Burners have been known to turn out clinker for high-early-strength cement at the same rate and under the same operating conditions used on normal clinker, though the total fluxes were lower and the tricalcium silicate percentage was higher in the high-early-strength clinker.

In the case of Mr. Koyanagi's cements, variations in analyses and in potential constitutions are too small to offer any explanation of his differences in cement strength. The relative fluxing values of iron or alumina seem to be neither apparent nor significant.

Cements and raw mixes may vary considerably in analyses and poten-

Analyses (Koyanagi)	Plant Product: No. 1 Original	Plant Product: No. 4 High Iron	Lab. Product: No. 1 Original	Lab. Product: No. 3 High-Al.
SiO_2	21.96	21.41	22.29	21.23
Al_2O_3	5.61	5.46	5.65	6.83
Fe_2O_3	2.79	3.79	2.66	2.43
CaO	65.84	65.84	65.31	65.20
MgO	1.49	1.36	1.17	1.70
SO_3	1.18	1.03	1.18	1.13
Ign. Loss	0.83	1.13	1.46	1.06
Total	99.70	100.02	99.72	99.58
28 day tensile strength kg/cm²	33.7	34.2	34.5	42.2
28 day compressive strength kg/cm²	553.1	498.4	560	620

* Major Hutton is now Assistant Director of Information, Bureau of Reclamation, Coulee Dam, Wash. He was formerly chief engineer, Pacific Coast Cement Co., Seattle, Wash.

TYPICAL PRODUCTS FIVE CEMENT PLANTS

	A	B	C	D	E
Insoluble	0.14	0.15	0.13	0.20	.023
SiO_2	24.18	23.60	21.60	21.18	21.52
Al_2O_3	3.88	4.54	4.40	6.27	7.01
Fe_2O_3	3.58	2.14	4.74	3.03	2.75
CaO	65.07	66.54	65.22	65.19	64.35
MgO	1.51	1.48	1.77	1.92	2.38
SO_3	1.51	1.67	1.79	1.39	1.62
Ign. Loss	0.98	0.76	1.34	1.33	1.33
Free Lime	1.80	0.57	0.58	2.22	1.47
C_4AF	10.88	6.51	14.40	9.22	8.36
C_3A	4.23	8.43	3.63	11.50	13.91
C_3S	38.05	50.83	57.39	44.97	36.63
C_2S	40.70	29.32	18.70	26.80	34.13
Tensile 1 day	110	190	175	130	85
3	245	320	320	285	225
5	335	355	350	335	320
7	340	410	360	395	375
28	465	540	385	470	435

tial constituents without showing great changes in properties. Other matters may be more important. The following analyses, made in one laboratory, cover cements produced in five scattered plants. Cements A and B are made from siliceous limestone to which very little clay is added. One is considered hard to burn by its maker, who burns close to the hood with a short flame, and the other is considered by its maker to be no more difficult to burn than mixes higher in alumina. It is burned well back in the kiln with a long flame. Cement C is made from a mixture of high-lime and siliceous low-lime rocks. High-lime rock is expensive, and iron ore is added to hold its percentage down. Cement D is made from limestone and shale. Cement E is made from high-calcium limestone and clay. All are ground to pass over 90 percent through the 200 mesh screen, and all were sound.

These analyses throw no light on the relative values of iron and alumina as fluxing agents, but they show that the alumina-iron oxide ratio may vary widely without producing unsound cement.

Whether to increase alumina or iron oxide, if more flux is needed in a raw mix, is usually a matter of materials available, costs, or cement properties. With a siliceous limestone, iron oxide is generally used, for clay, the only source of cheap alumina, also contains silica. With high-calcium limestone, clay is generally used because of its cheapness and fineness. If a cement resistant to sulphate waters is required, the iron oxide and alumina should be low, and approximately equal in percentage. If either iron oxide or alumina gives greater kiln capacity or better fuel ratio, or both, relative costs of raw materials may be of small importance. Convincing evidence on these points is wanting.

Many operators make the unqualified statement that troubles due apparently to deficiency of fluxing agents, in any cement mix whose analysis is within the range of common practice, are really due to want of proper grinding or mixing, or both; and that troubles due apparently to excess of fluxing agents are really due to bad flame management, or to highly fusible coal ash.

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Human Error in Sampling

(Continued from page 42)

larger size stones at this quarry which necessitated the adding of their percentages together. However, the omission of a dividing point between these two sizes was estimated from sieve analyses of a good many tests and from experience at other quarries, so it is felt that any error is slight.

It is quite interesting to see this curve as compared with the others. As anticipated, this curve fell below the other two. This is easily explained. In the case of the crusher test, the stone was graded through testing screens with practically 100 percent efficiency. In the actual production record, the stone was screened through quarry screens which did not have the same efficiency. Consequently, there is a considerable percentage of undersize in the stone due to inefficiency of quarry screens. This would account for a certain percentage of small stone; such as 1¼-in., ¾-in., and ½-in. being in the 2-in. and 1½-in. With this percentage added to the amount the crusher actually made of 2-in. and 1½-in., it can be seen readily that the actual tonnage of 2-in. and 1½-in. sold and placed in stock would be greater than what the crusher actually produced. This same theory would apply right on through, although the differential between the graphs would diminish as the lower limits were reached.

(To be continued)

Vindication in McNider Case Verdict

A VERDICT finally has been handed down by Judge Graven in the famous Ontjes-McNider case which has taken up many columns of Iowa newspapers. The estate of C. H. McNider, the late president of the Northwestern States Portland Cement Co., Mason City, Iowa, was sued for $2,273,143, alleging that the profits made by Mr. McNider on sales of La Salle Portland Cement Co., stocks should have been distributed to stockholders of the local cement company. Judge Graven refused this claim on the grounds that the cement company's directors had made it clear that they did not wish to make the investment.

The second portion of the claim was in connection with the sale of company owned stock by Mr. McNider to the First National Company of Mason City in which he was a large stockholder. The claim totaled $60,000. The judge allowed it in the amount of $27,000 on the grounds that Mr. McNider's holdings in the First National Company were so much larger than those in the cement company that he had an interest in the sale adverse to that of the company of which he was president and general manager.

The third division of the claim also was for $80,000 originally and was allowed in the amount of $30,000. It concerned bonuses paid to Mr. McNider at the end of the year in addition to his regular salary as manager and salary payments which Mr. Ontjes contended were excessive. The judge found all bonuses paid within the five years preceding the filing of the claim illegal. They included $5000 for each year in 1926 and 1927. Excess salary claims were allowed in the amount of $2,916.66 for 1926 and $15,000 in 1927. These awards were made on technicalities of law. The West Virginia statutes under which the corporation operated required that salaries and bonuses be determined by stockholders, a provision since repealed.

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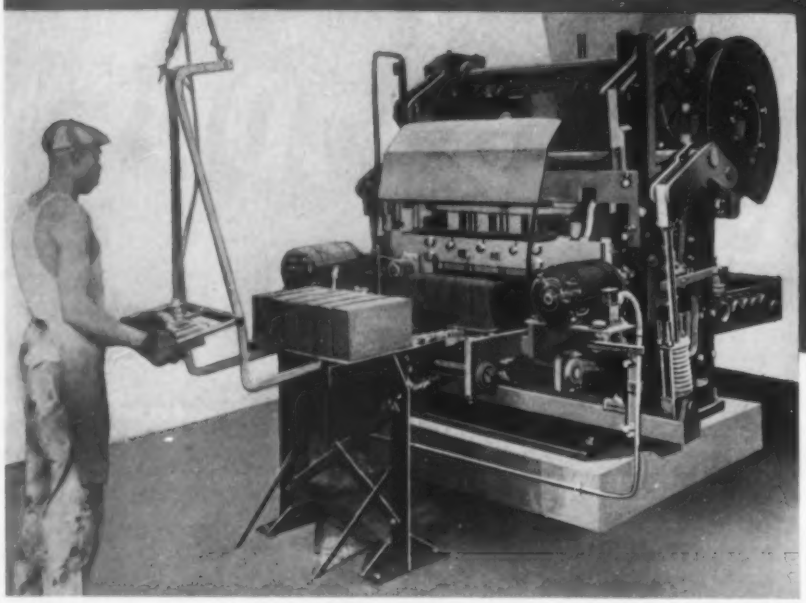

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THE SAVING IN PALLET COST WILL PAY FOR A BESSER PLAIN PALLET STRIPPER

High Speed Batching

Electric weigh lorry for batching aggregates, and "electric eye" control for cement handling make possible one-man operation

By BROR NORDBERG

CUSTOMER SERVICE POLICIES and the modern plant for ready-mixed concrete operated by Kern Rock Co., Ltd., Bakersfield, Calif., are both rather unusual and effective. In 1937 the company pioneered this product in Bakersfield, Calif., and Kern county and is now getting a good share of the concrete business on the basis of service plus quality.

An educational program under the direction of a concrete designer was instrumental in developing sales. Research, mix design and technical advice by this specialist have created new business and have maintained customer confidence and acceptance. The truck drivers, all steady and reliable employes, have also been drilled on the meaning of water-cement ratios and general technique so that on ordinary jobs they have the responsibility for making recommendations and properly adding make-up water into the mixer drums to fit the job conditions.

"Electric Eye" Controls Batcher

Special jobs, large projects and new orders are personally supervised by the concrete engineer until satisfactory designs and water consistencies are arrived at. Three years ago the company, which was incorporated to produce rock, sand and gravel, built an efficient plant for 150 tons hourly capacity of sand, gravel and crushed rock. As this plant is located only a few miles from the concrete plant site in the city, the aggregates are trucked in.

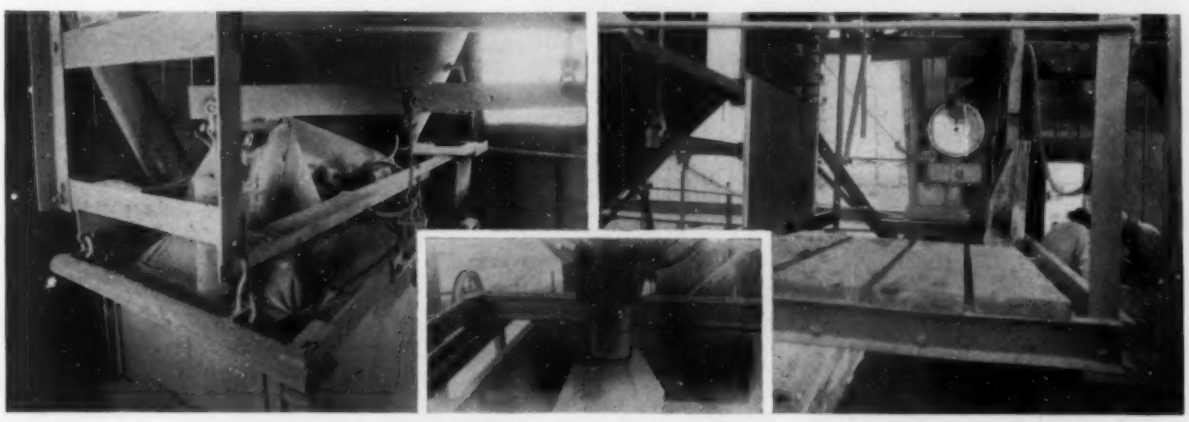
Both the concrete and the aggregates plants, which were designed by Dan Sill, president of the company, are different than most layouts. Cement is handled in bulk, weighed independently by "electric eye" control with a pneumatic valve cutoff, aggregate storage is 600 tons, and an electrically-propelled weigh lorry handles aggregates with precision.

Considering that six truck mixers are used, 600 tons aggregates storage appears to be large but, in Mr. Sill's opinion, larger rather than smaller storage tonnage would be desirable. The 600 tons is divided equally into eight bins, each with a different grading, and the bins are in a single row with the weigh batcher travel extending the full length of the bins.

Eight Bin Compartments

By having eight bin compartments, there is ample flexibility to meet a variation of customer requirements. Crushed rock or gravel may be specified, for example, or three sizes of gravel and two grades of sand might be required as in some state work. On other specifications the storage system gives an opportunity to recombine several stone sizes, each graded within a close range, rather than to use one grading with con-

Group of truck drivers with Dan Sill, president, fifth from the left, Charles H. Pomeroy, Jr., engineer, second from left



Left: Cement batcher showing inclined screw feeder from bin and inlet for compressed air to stimulate flow of cement, all controlled by operator on weigh lorry below. Center, inset: Showing how cement spout is connected to chute within aggregates batcher. Right: Cement scale operated by electric eye

siderable gap between low and top limit. This practice also reduces bin segregation. Another advantage claimed for the storage system is that moisture is held to a low, constant level. Sand, for instance, averages about 3 1-2 percent water in the bins.

Aggregate bins are designed for a minimum practical height, and aggregates are dumped into a hopper, fed out to a bucket elevator by an oscillating feeder, and into the compartments by shuttle belt conveyor.

Between one end of the bins and a cement warehouse is the truck driveway, which is below grade, and the cement bin and batcher are centered directly over the truck driveway. Cement comes in bulk by rail and is unloaded by a 5-in. Fuller-Kinyon pump unloader into the steel cement bin which has a capacity for three cars of cement (1200 sacks to a car).

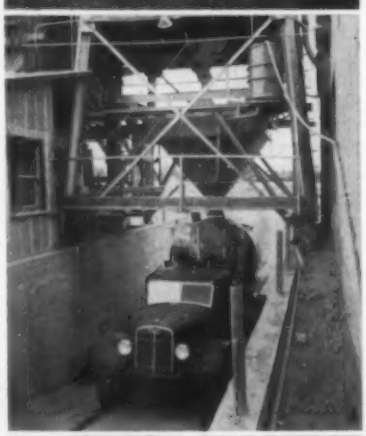
Cement is handled with Noble batcher equipment, consisting of a hopper with an air-operated valve for discharge. The spout through which weighed cement is discharged extends below, and is centered over the truck driveway.

Batching Out the Load

One man runs the plant, and performs all the batching operations on the weigh lorry, on which there is mounted a Fairbanks 4-beam scale and a 4-cu. yd. weigh hopper. Sizes of aggregates in each bin are designated on signs posted on the bin uprights with markers to indicate where the lorry should be spotted to draw from the correct bin. Cables for each bin gate extend from the bin drop gates to a hand-operated lever convenient to the operator so that it is not necessary to step off the platform. The car is controlled by simply throwing a lever engaging a clutch.

Having weighed out the aggregates, which involves several stops, the lorry is propelled to the end of the line which automatically spots the batcher directly below the cement weigh batcher discharge spout and directly over the position of the waiting truck mixer.

In this position, the operator on the weigh lorry is now in front of the cement scale, which has an adjustable electric eye connected in circuit with the screw feeder from the bin to the cement batcher and the pneumatic cutoff for the feed. The operator sets the "eye" according to the mix. Pressing the push button switch starts the feeder and another control admits compressed air near the throat of the cement bin to stimulate flow. Shut off is automatic and the batch of cement is ready to be discharged.



When the aggregate hopper is in the discharge position, the discharge spout of the cement hopper fits into a cement chute within the aggregate hopper, thus extending the cement spout all the way into the mixer drum. This chute bells out from a small diameter at the top and then tapers off again to a small diameter at the bottom to stimulate the free flow of cement without clogging.

A manually-operated slide gate is opened by a lever on the operating lorry to release aggregates into the mixer drum. Having started the discharge of aggregates, a push button releases the cement which enters the mixer drum simultaneously with the aggregates, giving a ribbon feed of partially mixed dry material. All the cement is discharged before the aggregate batcher is entirely emptied. Water is added later from the truck mixer water tank. It is claimed that the entire operation, for a 3½-cu. yd. batch, using five different aggregates, is completed in one minute.

The fleet consists of seven 3½-cu. yd. and one 1½-cu. yd. Jaeger drum mixers, with three Ford and five Autocar trucks all equipped with 4-wheel drives.

Stephens-Adamson Co. coöperated in the plant construction, furnishing various handling equipment, and in fabricating the weigh lorry. Aside from Mr. Sill, president, who until he became interested in the gravel and sand business had been in the oil well machinery supply business, the other officers are C. R. Warren, secretary-treasurer, and O. F. Foth, in charge of the concrete plant.

Charles H. Pomeroy, Jr., company engineer, had all his previous experience over many years in the cement industry. His past connections included a number of years as a Portland Cement Association engineer out of the Los Angeles office, cement plant chemist, cement plant operating man and other positions which well equip him for his present duties. The company also operates a Blaw-Knox batching plant in the nearby oil fields and operates over all of Kern county from its Bakersfield ready-mixed concrete plant.

From top to bottom. 1—Rear end of weigh lorry. Note how aggregates are identified by markers on side and handy pipe levers for discharging material into lorry hopper. 2—Opposite side of lorry, showing hopper. 3—Truck in loading position with aggregate hopper of weigh lorry stopped at discharge point. 4—Ready mixed concrete plant showing truck fleet. Below-grade truck entrance at the extreme right

Plant of the National Cement Products Co., and large covered and outside storage facilities

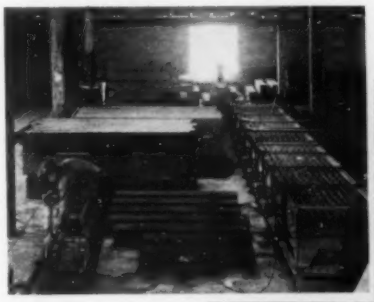
Plant Without Waste Space

Design production facilities in concrete products plant to utilize gravity in handling cement and aggregates

LOCATED between the East and the Middle West, the National Cement Products Co., Toledo, Ohio, is perhaps one of the best known and most visited concrete products plants in the country. The chief reasons for its popularity and interest to visitors have been the unusual aggressiveness of the company in adopting the most up-to-date manufacturing methods and equipment and in merchandising the high quality units produced.

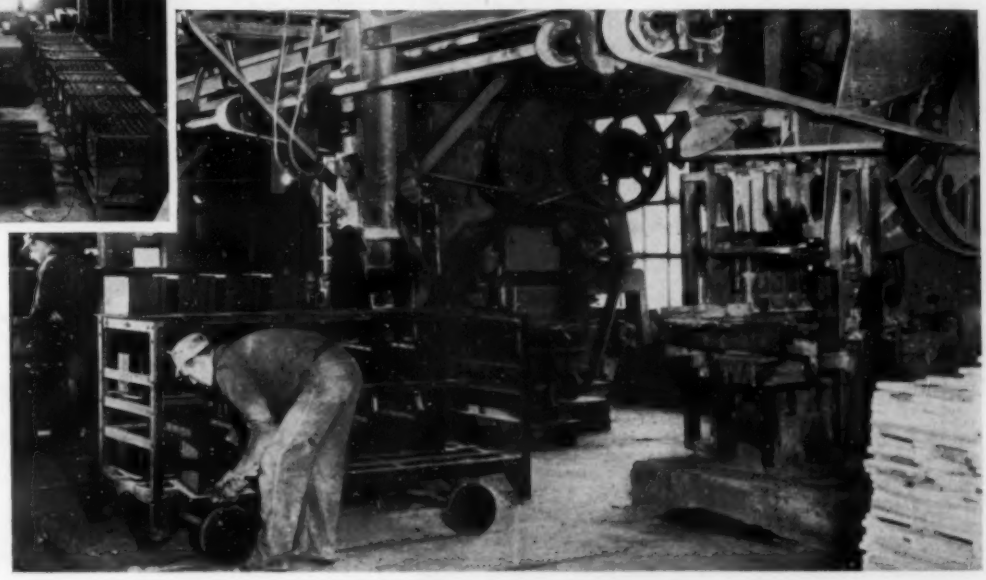
Cloyd B. Fellabaum, the present owner, founded the business in 1923. Although he started in a comparatively small way, the growth of the company has been constant. Production facilities have been enlarged and improved as fast as the market could be built up to absorb the greater output. Another factor influencing the company's growth has been the excellent market in Toledo for concrete masonry units for both business and residential construction.

The plant has been laid out for the least waste of time and labor in production. Block machines, which consist of two Besser Victory fully automatic strippers, one Anchor and two Multiplex machines, are in line opposite the steam curing rooms. Boilers maintain 10-lb. pressure for steam curing. Blocks are transferred from machines to the curing rooms on small trucks operating over narrow gauge track. After curing over night, blocks are carried on the same trucks to covered storage or to the yard.



Above: Precast department, showing joist machine to the right

Below: Block production room. Note steel racks mounted on rail trucks for convenient handling to curing rooms



Batching and mixing floor. Above the mixers may be seen the track-mounted electric lorry which transports batches to the mixers

With the plant located on the Toledo Terminal Railroad and on paved highways, aggregates are received both by rail and truck. Haydite, cinders and sand and gravel aggregates are each used in considerable quantities. Cinders are stored outside until crushed and are then placed in bins. Other aggregates are delivered by elevators directly to the bins which hold about 450 tons.

Aggregates are proportioned in the plant by an electric weigh lorry, and delivered over an overhead track to the four 40-cu. ft. mixers. Cement is delivered by rail and truck and stored on platforms. Cement storage capacity is 2000 bbl. The mixers are located on the mezzanine floor and the batches are proportioned by weight, two men taking care of four mixers.

A stock of between 500,000 and 800,000 blocks is carried in storage, permitting prompt delivery of units which have been properly cured. Monthly tests of units are made by the Toledo Testing Laboratory, Toledo, Ohio.

Other products made in this plant are concrete joists, sills and lintels which are produced by the vibration method.

Some of the recent notable jobs for which National Cement Products Co. have furnished units are: the Charles Weller Federal Housing Project, 100,000 sand-gravel units; Boys' Vocational School, 212,000 cinder concrete units; and Maumee School, 100,000 units.

Large Scale Concrete House Project Started

FIRESAFE HOUSING CORP., Watertown, Mass., completed its first all-concrete house in Newton Center, Mass., in about three weeks, and expects to finish the second house in ten days, according to a local report. Steam-cured, cinder concrete units are used in the walls, and the floors are laid with concrete joists and floor slabs. From 300 to 1000 people daily have inspected the first house since it was completed.

Mix Controls Vault Strength

Accurate control of cement-water ratio, selection and testing of aggregates produces a stronger burial vault

By BROR NORDBERG

BURIAL VAULTS manufactured from concrete designed for strength through accurate control of the cement-water ratio are being marketed by the Asphalt Vault Co., Inc., Atlanta, Ga., a new concern which is rapidly developing a thriving business.

A year ago this company was licensed by the Wilbert Haase Organization, Forest Park, Ill., to manufacture the "Monarch" reinforced concrete vault and the "Wilbert" concrete vault with asphalt waterproofed inner vault. Both types of vaults are being manufactured under the supervision of F. C. Bowen, general manager, who has made a detailed study of concrete design and mixes to produce a quality vault of uniform maximum strength and highly resistant to penetration by water.

Selecting Proper Mix

Before starting the manufacture of vaults, Mr. Bowen secured the services of a concrete designing engineer for a week to assist in testing various aggregates and concrete mixes and to develop a proper mix to be placed in the molds by vibration. The batch arrived at consists of 465 lb. of crushed granite, 465 lb. of natural sand, 16.5 gal. of water and three sacks of standard portland cement.

The sand used is a mason's sand, all passing 8-mesh, with plenty of 50-mesh material and some 100-mesh fines, which is shipped from Gaillard, Ga., in carload lots. The granite, ⅜-in. down with some ⅛-in. included to give a uniform gradation, is shipped in from Stone Mountain, Ga., where it is crushed from the waste rock left by the famous Robert E. Lee Memorial sculptoring on the side of Stone Mountain.

Aggregates are stocked in the bins of a local building supply dealer and delivered to the plant in 10-ton lots by truck. Having settled on a definite mix, a series of charts were worked up by Mr. Bowen, and testing equipment was installed to compensate quickly for moisture variations in aggregates, etc.

Each new car of either aggregate is tested for gradation, and moisture determinations are made for each batch of sand placed in the bins. These tests are performed the first thing in the morning by Mr. Bowen personally and the mixing water corrections are passed on to the mixer operator.

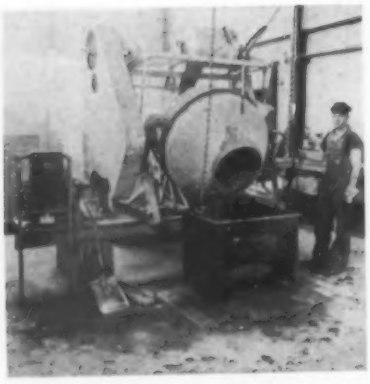
A grab sample of sand is taken from the center of the pile of sand and 500 gm. is carefully weighed on sensitive scales for the moisture determination factor which is read directly from a Chapman flask containing 200 cc. of water and the sand sample. Mixing water is measured into the Jaeger 3-bag mixer and aggregates are weighed in wheelbarrows on a Howe scale. The whole is mixed not less than 10 minutes, giving a very plastic concrete that is easily placed into the molds with the help of pneumatic vibrators.

Production Line Methods

Cylinder test samples broken by the Georgia State Highway Department show this mix to produce 3500 p.s.i. concrete at seven days and 5500 p.s.i. at 28 days—all uniform. In fact, Mr. Bowen is so certain of his strengths that vaults are stored in tiers six high in the plant, each bearing on the one below.

Plant is arranged for efficient handling, the new 30- x 136-ft. fireproof building being sectioned off to receive aggregates in one end with each succeeding step in the manufacturing process which proceeds toward

Above: From the mixer, overhead electric hoist spots concrete bucket over vault cover molds. Note operator preparing to hang pneumatic vibrator on mold. Below: Completed vault cover on the left, and one prepared to receive concrete



Tilting mixer discharging into concrete bucket which is conveyed by overhead electric hoist and monorail system to vault molds

the other end where the finished vault is stocked.

The first half of the building is the manufacturing end, the rest is used for storage where ordinarily about 150 vaults are stocked. Aggregate bins are close to the mixer charging hopper so that wheelbarrows are needed only for weighing and dumping.

Concrete discharges into a measuring bucket which is handled by two 2-ton overhead McCollum electric hoists on a rail system to the molds where it is discharged. The concrete is placed by trowelling while the form is vibrated. Pneumatically-operated New Haven vibrators are attached to the form at two locations while placing the concrete. Air at about 150 p.s.i. is supplied to the vibrators by a Champion Pneumatic Co. motor-driven air compressor. Similarly, air vibrators are used in casting vault covers. About 15 minutes are required to pour the complete vault, with the vibrators actually operating about eight minutes. Forms are stripped the day after a pour and the same overhead hoists are used to handle the vaults to stock. All vaults are air-cured a minimum of 28 days before delivery.

The plant was designed for future expansion, and, judging from the growth in volume of business thus far, the additional capacity likely will be needed.

To service burials, complete accessory equipment including lowering devices, artificial grass and tents is available, and deliveries are made in a modern Ford V-8 truck with special body capable of handling four vaults.

Sales of vaults have trebled since the plant was opened. Mr. Bowen's policy in designing and controlling concrete mixes and in maintaining a plant of modern design is his biggest sales point. He gets the undertakers to come to his plant, to inspect it and to see how concrete vaults are made.

Concrete Vault Activities

WALTER S. WESSEL, owner of the Reinhardt Burial Vault Co., St. Louis, Mo., has sold out to Walter F. Jones. The company has moved to a new location, and many improvements are planned. Mr. Jones, the new owner, has developed a new type of vault which he is planning to market.

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THE BURIAL CASE CO., New Haven, Conn., has been building a new plant which it expects to open this Fall.

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HOLZ MAUSOLEUM, INC., has purchased a tract of land near Cleveland, Ohio, and has let a contract to the Austin Co. for the erection of a new concrete vault factory. The building will be about 60 ft. wide by 275 ft. long.

New Ready Mixed Concrete Enterprises

CORNELL-YOUNG CO., INC., contractor of Macon, Ga., has gone into the ready mixed concrete business. The new ready mixed plant comprises: a Lorain crane; an Erie aggremeter plant of 68 tons capacity with three compartments; an all-metal house for cement storage; and six 1½-cu. yd. truck mixers mounted on Ford trucks. The officers are President, W. A. Young; vice-presidents, G. P. Jones and W. L. Young, and R. Harrison, secretary.

•

A. J. CLEMENTZ'S SONS, Massillon, Ohio, operator of a sand and gravel pit, has added ready mixed concrete as a side-line.

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CONSTRUCTION MATERIALS CO., Grand Island, Neb., formerly Diamond Engineering Co., ready mixed concrete producer, is preparing to open a concrete block plant.

Above: Showing how two pneumatic vibrators are attached to each vault mold. Workers with trowels assist the action of vibrators. Below: On left is the "Wilbert" inside asphalt vault, showing reinforcing, before mold sides were attached to receive concrete

Indict Union Officials in Truck Driver Jurisdictional Battle

JURISDICTIONAL BATTLES between affiliated unions under the wing of the A. F. of L. or between A. F. of L. and the C. I. O. may no longer be waged without consideration of the losses imposed on business and the public in general. The heavy hand of the Federal Courts at last has reached out to give relief to harassed business by the action of the Federal Grand Jury for the District of Columbia in returning indictments charging violations of Section 3 of the Sherman Anti-trust Act by representatives of the International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers of America and Local Union No. 639 of the International.

This action came to a head as the result of trouble between the teamsters and the operating engineers' unions, both A. F. of L., over the right to drive ready-mixed concrete trucks in Washington, D. C., which is threatening to produce a general strike among the local building trades and has seriously affected large governmental and other building construction in the capital. The ready-mixed concrete industry is no stranger to difficulties of this kind in the past, but in other situations, it has been the operating engineers who have attempted to take over work being done by teamster union employes.

It is said that the indictments represent the first phase locally of the construction inquiry the Department of Justice is pressing in a number of cities. The conspiracy charge in the indictment is set forth as follows:

"Beginning on or about the 16th day of May, 1939, and continuously thereafter up to and including the date of the finding of this indictment, the defendants, together with divers other persons to the grand jurors unknown and in violation of the act of Congress of July 2, 1890, commonly known as the Sherman Anti-Trust Act, have knowingly, willfully and unlawfully engaged within the District of Columbia in a combination and conspiracy to restrain trade and commerce of, and in, the District of Columbia, to wit: The construction of buildings and other public and private works in the District of Columbia, and the trade and commerce in materials used or to be used in the construction of said buildings and private and public works; and that it was part of said conspiracy that said restraint would be and was effected by employment of strikers, boycotts and by threats to use, and the use of, force and violence."

It was pointed out in the indictment that in the alleged conspiracy an attempt was made to compel various companies operating ready-mixed concrete trucks to employ as drivers only members of Local 639 and to breach contracts previously entered into by the companies with the International Union of Operating Engineers, Local 77. The three companies named are: Howat Concrete Co., Maloney Concrete Co., and Super Concrete Corp. These companies are said to operate more than 50 percent of all mixer trucks and were employing about 75 percent of their operators and drivers from the ranks of the operating engineers' union. It further sought, the indictment charges, to compel the drivers to resign from the operating engineers and become members of the teamsters' local.

Another charge in the indictment, states, "The said conspiracy and each of the acts of said conspirators was not intended to be, nor was it in fact, in aid of higher wages, shorter hours, better working conditions for labor or any other legitimate object of a labor union," but that it had as its "sole object" the replacing of Local 77 members by Local 639 members.

New Company Makes Ornamental Stone

ORNAMENTAL CAST STONE CO., Hot Springs, Ark., is the name of a new company organized by Cleveland Smith of the Smith Brothers Construction and Material Co., and Jack W. Thompson who has had 25 years' experience in the ornamental cast stone business. This company has the contract to furnish cast stone for the new Agricultural and Mechanical College building at Monticello, Ark., which involves 600 pieces.

From Sand and Gravel to Concrete Bricks

AMBRAW SAND AND GRAVEL CO., Lawrenceville, Ill., has installed machinery for making concrete bricks and building blocks, according to an announcement by Oran S. Calvert. The plant will have a capacity of 6000 brick daily when the plant starts production. Materials for making the concrete products will be provided from the company's pit north of the city which has a capacity of 1500 tons daily.

PROVO SAND AND GRAVEL CO., Provo, Utah, is planning to expand its activities into the concrete products field. Although plant construction is not under way, it is expected that eventually the company will be making a diversified line of concrete products.

Open Second Concrete Block Plant

THE WEST BEND CONCRETE PRODUCTS CO., West Bend, Wis., recently opened its second concrete block manufacturing plant at Menomonee Falls. Leonard Yahr is president of the company and Joseph Cook is superintendent of the new plant at Menomonee Falls, Wis.

While the West Bend plant makes the conventional concrete block of sand, gravel and cement, the new plant will specialize in concrete blocks made with Waylite aggregate.

Start Up Large New York Ready Mixed Plant

TRANSIT MIX CONCRETE CORP., New York, N. Y., owned and built by the McCormack Sand & Gravel Co., will soon place in operation a new Blaw-Knox ready mixed concrete batching plant. A large fleet of 5-cu. yd. Jaeger mixer trucks will operate from the batching plant.

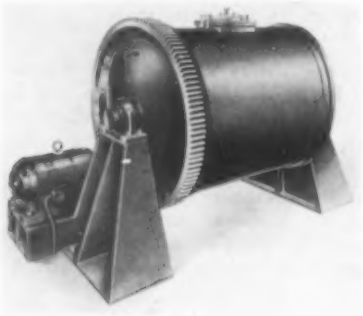
Marietta Starts Up Schenectady Plant

MARIETTA CONCRETE CORP., Marietta, Ohio, well-known manufacturer of concrete silos and other special products, expects to have a branch factory in operation at Schenectady, N. Y., in the very near future. Leonard Christy will be in charge of operations. Frank L. Christy, president; Charles D. Fogle, secretary and counsel for the company; and Charles D. Ross, director in charge of the eastern district, were recent guests of the Schenectady Chamber of Commerce when plans for the new branch were announced.

NEW MACHINERY * NEW EQUIPMENT

Ball Mills With Self-Aligning Roller Bearings

H. K. PORTER CO., INC., Pittsburgh, Penn., has added a line of ball and pebble mills to its processing equipment manufacturing activities. To reduce power requirements, the mills are supported on self-aligning roller bearings. They also may be obtained fully jacketed around the shell and at both ends which is effective in reducing the quantity of heating or cooling media required. Even distribution of the heating or cooling media over the ends is obtained by means of baffles which are cast integral with the steel heads.



Ball mill with integral mill and motor stands to prevent misalignment of driving pinion

Mills are designed with integral mill and motor stands in order to eliminate gear spread and misalignment of the driving pinion. Stands are of heavy steel plate fabricated by welding. The mills range in size from 16- x 21-in. to 8- x 10-ft.

All unlined mills are constructed of high carbon steel with a manganese content of 1.5 to 2 percent, and having a tensile strength of over 100,000 p.s.i., and a Brinell hardness of between 200 and 250.

Faster Action With Detachable Bucket

BROOKS EQUIPMENT AND MANUFACTURING CO., Knoxville, Tenn., has announced an improved model "CH" detachable bucket for truck hauling.

Load distribution is well forward of the rear axle, which eliminates excessive strains on the chassis, and enables a 1½-ton truck to carry a fully loaded 2-cu. yd. bucket. A unique jackleg device, attached to the rear end of the "Load Lugger" frame, relieves the truck chassis of the overhanging load when the bucket is being raised, and makes counterweights unnecessary. This jackleg adjusts itself to ground level, and is operated from the driver's seat.

The hoisting mechanism is operated by a simple power take-off from the truck engine. The hydraulic hoist is a heavy-duty double-type unit which raises or lowers both bucket-booms at once. Simplified control is a feature of the improved bucket. The driver handles all operations from the cab, using one lever for controlling the oil valve of the hydraulic hoist and for engaging the dumping hook in discharging the bucket. The bucket is tripped by the dumping hook as it is lowered over the end plate, thus giving higher discharge and quicker spotting of the load.

Detachable bucket, mounted on 1½-ton truck, has a capacity of 2-cu. yd.

Diesel-powered Excavator

BUCYRUS-ERIE CO., South Milwaukee, Wis., has announced the 54-B, a 2½ cu. yd. Diesel-powered convertible shovel, dragline, clamshell, lifting crane. It has a quarry-type boom, wide outside dipper stick, welded heavy-duty dipper, and positive crowd. Although the shovel front-end is the same type as on the 4, 5, and 6 cu. yd. Bucyrus-Erie quarry and mining shovels, it is said to be so compact that it comes within clearances of most standard gauge railroads and may be shipped without major dismantling.

Clearances are reduced, and the center of gravity lowered, by combining roller path and swing rack in the truck frame casting. The center pintle and the heavy reinforcements necessary to support it are eliminated by the use of single plane conical hook rollers, and the A-frame is arranged so that it can be easily lowered without dismantling the cab.

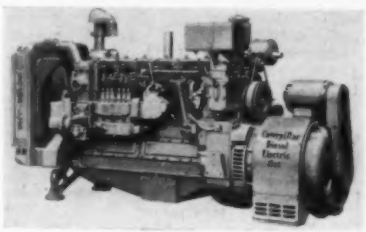
Compact 2½ cu. yd. Diesel-powered shovel also available as a three-motor electric machine

Accessibility for maintenance and adjustment is obtained by having the entire right side of the cab free of machinery with a cross-aisle between engine and main machinery. The drive shaft is in two sections so that either section of the shaft can be removed without disturbing the other.

Diesel-Electric Set For Aggregates Plants

CATERPILLAR TRACTOR CO., Peoria, Ill., is now in production on a 30-kw. diesel-electric set known as the model 46-30. This set includes a 6-cyl. diesel engine which has all the electrical equipment inbuilt, with the exception of a circuit breaker. The set is said to be particularly adaptable for use in quarries and sand and gravel plants where electric power is not readily available.

The engine has but three operating adjustments, none of which involves the diesel fuel system. The generator is of single unit construction equipped with ball bearings. It is



All electrical equipment is built-in in this 30-kw. diesel-electric set

claimed that with built-in regulation, the diesel-electric set will pick up large motor loads with little light flicker and voltage drop.

Walking Draglines

THE MARION STEAM SHOVEL CO., Marion, Ohio, has brought out a line of walking draglines which are said to be particularly efficient in operations where soft ground may be encountered. In the illustration is shown the Type 7200 walking dragline equipped with a 5-cu. yd. bucket and a 100-ft. boom.

When digging, the upper frame rests on a large diameter base or tub, the bearing of which is high in comparison with that of the crawlers on the conventional type machines. One of the features of this walking dragline is that, at the initial stage of the walking step, suction on the tub or base is broken rapidly and the movement of the base is such as to raise it quickly and thus lower the resistance against movement of the material into which the tub may have sunk.

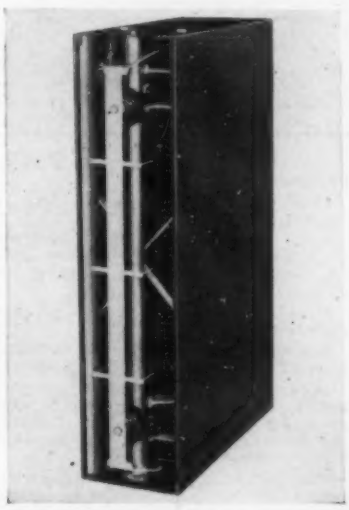
The working movement is actuated by cranks, one on each end of a large diameter shaft, which is mounted across the rotating frame and extends outward on each side. Each crank is connected to a walking "shoe" which, when the crank is rotated, makes contact with the ground to support the weight of the machine, while the dragline moves in the desired direction. This cycle is repeated, the cranks alternately raising the walking shoes, moving them forward until they make contact with the ground and then moving the machine itself.

Walking dragline equipped with 5-cu. yd. bucket and 100-ft. boom

Removing Dust By An Electrostatic Method

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., East Pittsburgh, Penn., has developed an electrostatic dust collector unit which is known as the Precipitron. This unit is similar in principle to the Cottrell system, but voltage has been reduced to 13,000.

The Precipitron consists of two major parts, the cell and the power pack. Very fine tungsten wires are suspended in the leading edge of the cell, and at the outer sides of these wires is a grounded rod. Between the wire and the rod 13,000 volts d-c. is applied, creating a strong electrostatic field within the cell. As the air passes through this static field, every particle of foreign matter, regardless of size or make-up, receives a positive charge. Within the next area of the cell, the collector, are parallel plates, charged with 6000 volts d-c., and spaced $\frac{5}{16}$-in. apart. Since unlike charges attract, these positively charged particles are attracted to the negative plates and grounded.



Electrostatic dust collecting cell

As the foreign particle passes through the field between the wire and the rod, positive ions attach themselves to the particle as a surface charge. Then the charged particle passes on through the plate assembly where the force action from the electrostatic field between the plates causes the particle to be precipitated on the plate.

The function of the pack is to step up incoming a-c. voltage and convert it to the required d-c. voltage. Packs are available in two sizes. The type S which handles up to and including 12 of the 8- x 36-in. cells or up to 24 of the 8- x 18-in. cells, and the type L which handles from 12 to 50 cells. Within the pack is a transformer, capacitors, rectifier tubes, and sentinel breaker. The magnetic leakage (high-reactance type) transformer is said to be completely self-protected against short circuits. The function of the Inerteen capacitors is to smooth out the pulsating voltages of the d-c. operating current. The type WL-579 high vacuum rectifier tubes, developed especially for use with this equipment, serve to convert the stepped-up a-c. incoming voltage to the necessary d-c. operating voltage. To safeguard further against short circuits, a sentinel breaker has been placed in the primary line which will trip out on excessive current. Both power packs are equipped with safety door switches which open the primary circuit when the door is opened.

Under the new blackness test worked out in coöperation with the National Bureau of Standards, the efficiency of the Precipitron is said to be 85 percent at 750 c.f.m. and 90 percent at 600 c.f.m. per 36-in. cell.

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of October 14:

Central

59562. Establish on **phosphate di-calcium**, C. L., min. wt. 60,000 lb., from Detroit, Mich., to Albany, N. Y., 34c.

59563. Establish on **stone**, crushed, coated with oil, tar or asphaltum (oil tar or asphaltum not to exceed 10 per cent by weight of the commodity shipped), C. L., from Chicago, Ill., to Samaria, Mich., 244c; Lulu, Mich., 244c; Ann Arbor, Mich., 244c, and Chilson, Mich., 257c per net ton.

59571 (1). Establish rates on **lime**, common, hydrated, quick or slaked, C. L., from producing pts. in C. F. A. terry. to destinations in Extended Zone C terry. in Wisconsin as follows:

Distance	Min. 30,000 lbs.	50,000 lbs.
100 miles and over 90....	12	10
110 miles and over 100....	13	10
120 miles and over 110....	13	10½
130 miles and over 120....	14	11
140 miles and over 130....	14	12
150 miles and over 140....	14	12
160 miles and over 150....	15	12
180 miles and over 160....	16	12
200 miles and over 180....	17	13
210 miles and over 200....	17	14
220 miles and over 210....	18	14
230 miles and over 220....	18	14
240 miles and over 230....	18	14
260 miles and over 240....	19	15
280 miles and over 260....	19	15
300 miles and over 280....	20	16
310 miles and over 300....	20	17
320 miles and over 310....	20	17
340 miles and over 320....	21	17
360 miles and over 340....	21	17
370 miles and over 360....	22	18
380 miles and over 370....	22	18
400 miles and over 380....	23	18
420 miles and over 400....	23	19
430 miles and over 420....	24	19
440 miles and over 430....	24	19
460 miles and over 440....	24	19
480 miles and over 460....	25	20
490 miles and over 480....	25	20
500 miles and over 490....	25	20
520 miles and over 500....	26	21
525 miles and over 520....	26	21
550 miles and over 525....	26	21
575 miles and over 550....	27	21
580 miles and over 575....	28	22
600 miles and over 580....	28	22
610 miles and over 600....	28	23
625 miles and over 610....	28	23
640 miles and over 625....	29	23
650 miles and over 640....	29	23
670 miles and over 650....	29	23
675 miles and over 670....	29	23
700 miles and over 675....	30	24

59583. Establish on **lime**, common, hydrated, quick or slaked, C. L., Chicago, Ill., to destinations in Indiana and Michigan. rates in cents per 100 lb. as follows: ("A" refers to min. wt. of 30,000 lb. and "B" to min. wt. of 50,000 lb.) to: Porter, Ind. "A", 10½; "B", 8½; New Buffalo, Mich., "A", 12; "B", 9½; Lydick, Ind., "A", 12; "B", 10; Niles, Mich. "A", 13; "B", 10; Cassopolis, Mich., "A", 13; "B", 10½; Three Rivers, Mich., "A", 14; "B", 11; Clarendon, Mich., "A", 15; "B", 12; Grand Jct., Mich., "A", 14; "B", 11; Ypsilanti, Mich., "A", 17; "B", 13; Ecorse, Mich., "A", 18; "B", 14; Warner, Mich., "A", 17; "B", 14; Eaton Rapids, Mich., "A", 15; "B", 12; Rives Jct., Mich., "A" 16; "B", 13; Lansing, Mich., "A", 17; "B" 13; Owosso, Mich., "A", 17; "B", 14; Bay City (W. S.), Mich., "A", 18; "B", 14; Midland, Mich, "A", 18; "B", 14; Lapeer, Mich., "A", 18; "B", 14; Bay City (E. S.), Mich., "A", 18; "B", 14; Caro, Mich., "A", 19; "B", 15; Gladwin, Mich., "A", 19; "B", 15; Grayling, Mich., "A", 20; "B", 16; Sallings, Mich., "A", 20; "B", 17; Johannesburg, Mich., "A", 21; "B", 17; Gaylord, Mich., "A", 20; "B", 17; Mackinaw City, Mich., "A", 20; "B", 17; Lawton, Mich., "A", 13; "B", 10½.

59584. Establish on **stone, crushed** (in bulk), and **crushed stone screenings** (in bulk) in open top cars, C. L., West Columbus, Ohio, to Newark, Ohio, 60c per net ton via N. Y. C. R. R., Columbus, Ohio, B. & O. R. R.

59610. Establish on **sand, all kinds, and gravel**, in open top equipment, C. L., actual wt. will apply, Streetsboro, Ohio, to Mentor, Ohio, 94c per net ton via W. & L. E.—Cleveland, Ohio, and N. Y. C. or N. Y. C. & St. L.

59723. Establish on **limestone, agricultural**, unburnt, in box cars, and also in open top cars, Gibsonburg and Woodville, Ohio, to Watertown and Peck, Mich., 176c, in box cars, min. wt. 50,000 lb. and 158c per net ton in open top cars.

59735. Establish on **lime, common, hydrated, quick or slaked**, C. L., in bags, barrels, casks, iron drums, or in bulk as provided for in straight C. L. in Official Classn.

Proposed Rates, in Cents per 100 lb., from Hannibal, Mo., Marblehead and Quincy, Ill. ("A" refers to min. wt. 36,000 lb. and "B" to min. wt. 50,000 lb.) To Athens, O., "A" 23; "B" 19; Cadiz, O., "A" 24; "B" 19; Carrollton, O., "A" 24; "B" 19; Hillsboro, O., "A" 21; "B" 17; Jefferson, O., "A" 24; "B" 19; Logan, O., "A" 23; "B" 18; Malta, O., "A" 24; "B" 19; Mt. Gilead, O., "A" 20; "B" 18; Nelsonville, O., "A" 23; "B" 19; Norwalk, O., "A" 22; "B" 18; Painesville, O., "A" 24; "B" 19; Paulding, O., "A" 20; "B" 17; Pomeroy, O., "A" 24; "B" 19; St. Clairsville, "A" 24; "B" 19; Urbana, O., "A" 21; "B" 17; Big Rapids, Mich., "A" 22; "B" 18; Gladwin, Mich., "A" 24; "B" 19; Harrison, Mich., "A" 23; "B" 19; Hastings, Mich., "A" 21; "B" 17; Ionia, Mich., "A" 21; "B" 17; Lake City, Mich., "A" 23; "B" 19; Mt. Clemens, Mich, "A" 23; "B" 18; Sandusky, Mich., "A" 24; "B" 19.

59739. Establish on **limestone**, unburnt, ground or pulverized, C. L., min. wt. 60,000 lb., Northwestern Ohio Group 1 origins, viz.: Carey, Genoa, Gibsonburg, Luckey, Maple Grove, Marblehead, Martin, McVittys, Narlo and Woodville, Ohio, to Jamestown, N. Y., 226c per net ton.

59741 (Cancels W. D. A. 59583). Establish on **lime**, common, hydrated, quick or slaked, C. L., Chicago, Ill., to following points: "A" refers to min. wt. of 30,000 lb. and "B" to min. wt. of 50,000 lb. (Rates in cents per 100 lb.). To (representative): Porter, Ind., (A) 10½, (B) 8½; New Buffalo, Mich., (A) 12, (B) 9½; Galien, Mich., (A) 12, (B) 10; Cassopolis, Mich., (A) 13, (B) 10½; Three Rivers, Mich., (A) 14, (B) 11; Homer, Mich., (A) 15, (B) 12; Lawton, Mich., (A) 13, (B) 10½; Albion, Mich., (A) 15, (B) 12; Ipsilanti, Mich., (A) 17, (B) 13; Beaufait Sta., Mich., (A) 18, (B) 14; Rives Jct., Mich., (A) 16, (B) 13; Lansing, Mich., (A) 15, (B) 12; Owosso, Mich., (A) 17, (B) 13; Vassar, Mich., (A) 18, (B) 14; Bay City (W. S.), Mich., (A) 18, (B) 14; Gladwin, Mich., (A) 19, (B) 15; Rasmus, Mich., (A) 20, (B) 16; Mackinaw City, Mich., (A) 20, (B) 17; Oxford, Mich., (A) 18, (B) 14; Rochester, Mich., (A) 18, (B) 14.

59754. Establish on (a) **sand and gravel**, and (b) **crushed stone and crushed stone screenings**, C. L., to Colfax, Ind. (a) From Kenneth, Ind., and (b) Logansport, Ind., 45c per net ton, via P. R. R. direct.

59778. Establish on **sand, silica**, C. L., Ottawa-Utica, Ill., district to Oshawa, Ont., 440c per net ton, via C. R. I. & P. or C. B. & Q., Chicago and connections.

59788. Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., Chicago, Ill., to Ft. Wayne, Ind., 182c per net ton.

59789. Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., Woodville, Ohio, to Morenci, Mich., 127c; Fayette, Ohio, 138c per net ton.

Sup. 1 to W. D. A. 59789. Amendment notice, White Docket Advice 59789, Docket Bulletin 3005, to establish rates on **limestone**, ground or pulverized, unburnt, C. L., Woodville, O., to Morenci, Mich., and Fayette, O., is hereby amended by providing for addition of following proposed rates the following points in Ohio to Morenci, Mich. (marked "A") and to Fayette, Ohio (marked "B") from: Genoa, "A" 127, "B" 132; Martin, "A" 127, "B" 132; Marblehead, "A" 149, "B" 149; Luckey, "A" 127, "B" 132; Carey, "A" 154, "B" 165; McVittys, "A" 165, "B" 165.

59804. Establish on **slag**, crushed or crushed commercial (not granulated) in open top cars, C. L., Hamilton, Ohio, to Bedford, Ind., 138c per net ton.

59812. Establish on **limestone**, ground or pulverized, unburnt, straight or mixed C. L., min. wt. 60,000 lb., Bloomington, Ind., to Eau Claire, Wis., 347c; La Crosse, Wis., 336c; Buffalo, N. Y., 347c; Lima Ohio, 204c; Rome, N. Y., 435c per net ton.

59829. Revise rates on **lime**, common, hydrated, quick or slaked, in bulk or in packages, as provided for C. L. shipments in Sou. Classn., C. L., to Fellsmere, Fla.

Proposed (rates in cents per net ton):

From	(a)	(b)
Gibsonburg, Ohio, Group.....	858	687
Cold Springs, Ohio, Group...	803	642
Huntington, Ind.	836	669
Marble Cliff, Ohio, Group....	825	660
Mitchell, Ind., Group.....	803	642
Scioto, Ohio	825	660

(a) Min. wt. 30,000 lbs. (b) Min. wt. 50,000 lbs.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

59831. Establish on **limestone**, unburnt, ground or pulverized, C. L., min. wt. 60,000 lb., from Northwestern Ohio Group 1 origins, viz.: Carey, Genoa, Gibsonburg, Luckey, Maple Grove, Marblehead, Martin, McVittys, Narlo and Woodville, to Niagara Falls, N. Y., 237c per net ton.

59832. Establish on **stone**, crushed, in bulk, and **crushed stone screenings**, in bulk in open top cars, C. L., Albany, Ohio, to Charleston, W. Va., 116c; Gauley Bridge, W. Va., 138c; Huntington, W. Va., 121c per net ton. Route: To Charleston and Gauley Bridge via N. Y. C. direct. To Huntington, W. Va., via N. Y. C. R. R.-Point Pleasant, W. Va.-B. & O. R. R.

59833. Establish on **limestone, agricultural**, and **screenings, agricultural limestone**, unburned, in bulk, in open-top cars only, C. L., also **agricultural limestone**, unburned, **agricultural limestone meal** or **agricultural limestone screenings**, in box cars, min. wt. 50,000 lb., McVittys, Ohio, to Powhatan, Ohio, 160c in open-top equipment and 198c per net ton in box car equipment, via N. Y. C. (C.), Forest, Ohio, P. R. R.

59834. Establish on **agricultural limestone** (not ground or pulverized), unburned, in bulk in open top cars, C. L., Spore, Ohio, to Reedy and Spencer, W. Va., 231c per net ton. Route: Via N. Y. C. R. R.-Point Pleasant, W. Va.-B. & O. R. R. Via N. Y. C. R. R.-Heath, Ohio,-B. & O. R. R.

59893. Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., Hannibal, Mo., and Quincy, Ill. to Adrian and Jackson, Mich., 314c per net ton via usual available percentage routes.

59894. Establish on **sand** (except industrial), in open equipment, C. L. (See Note 6), and in closed equipment, C. L., from the so-called Vassar Group, viz.: Vassar, Wampson, McHale, Juniata and Watrousville, Mich., to Geneva, N. Y., 286c; Jamestown, Olean, N. Y., 264c; Syracuse, N. Y., 297c, and Utica, N. Y., 319c per net ton.

59898. Establish on **rough quarried limestone scrap** (not suitable for building purposes), in open top cars, C. L., Alexandria, Ind., to Dover, N. J., 418c per net ton.

59906. Establish on **slag**, granulated (light weight concrete aggregate), in open top car equipment, C. L. (See Note 3), Chicago, Ill., to Celina, Ohio, 190c per net ton.

59937. Establish on (a) **sand** (except industrial), and **gravel**, in open top cars (rates in open top cars will not apply on shipments with tarpaulin or other protective covering. In such instances the rates applicable on shipments in closed equipment will be assessed.) (b) **Sand** (except industrial), and **gravel**, in closed equipment, C. L. From Chardon, Ohio. Proposed rates in cents per net ton to Brockway, Penn. .....(A) *154, (B) 198
Jeannette, Penn. .....(A) 154, (B) 176
Washington, N. Y. ....(A) *143, (B) 187
Lancaster, N. Y. .....(A) 176, (B) 198
Niagara Falls, N. Y.....(A) 176, (B) 198

*Single line scale basis via the B. & O. R. R. direct.

60037. Establish on (a) **sand**, naturally bonded moulding, in all kinds of equipment, C. L.; **sand** (except industrial), in closed equipment, C. L.; (b) **sand**, ground or pulverized, in all kinds of equipment, C. L.; (c) **sand** (except industrial), in open top equipment, C. L. (see note 6), from Grand Haven, Muskegon and Rosy Mound, Mich.

	Proposed Rates		
To	(a)	(b)	(c)
Geneva, N. Y. 330	363	330
Jamestown, N. Y. 319	351	319
Olean, N. Y.....319	351	319
Syracuse, N. Y. 352	387	352
Utica, N. Y. 363	399	363

Rates being in cents per net ton.

59936. Establish on **sand**, all kinds, and **gravel**, C. L., Chardon, Ohio, to Zanesville, Ohio, 149c in open top cars and 171c per net ton in box cars.

Trunk

Sup. 1 to 38068. **Limestone**, crude, in open top equipment, C. L. (See Note 3), from Engle, Martinsburg, W. Va., Stephens City, Capon Road and Strasburg Jct., Va., to Avonmore, Penn., $1.39 per gross ton.

Sup. 2 to 38068. **Limestone**, crude, in open top equipment, C. L. (See Note 3), from York, Bittinger and Thomasville, Penn., to Avonmore, Penn., $1.39 per gross ton and from Capon Road, Va., to Avonmore, Penn., $1.42 per gross ton. Eliminate Strasburg Jct., Va., as origin point from Supplement No. 1 to R. P. No. 38068.

Sup. 3 to 38068. **Limestone**, crude, in open top equipment, C. L. (See Note 3), from Annville, Myerstown, Palmyra and Swatara, Penn., to Avonmore, Penn., $1.70 per net ton.

38130. **Crushed stone**, coated with oil, tar or asphaltum, C. L. (See Note 3), from Oaks Corners, N. Y., to Grover, Penn., $1.61 per net ton, in lieu of current sixth class rate. (See Note 5.)

38148. **Slag**, C. L. (See Note 3), from Low Moor, Va., to Hartmand, Ind., 16c per 100 lb. (See Note 5.)

38151. **Dolomite**, crude, C. L., and **dolomite**, roasted (refractory dolomite in granular form, treated or untreated, clinkered and/or burned to a dead state), C. L. (See Note 3), from Pleasant Gap, Penn.

	Crude Dolomite	Roasted Dolomite
Pittsburgh, Penn.	$1.51 GT	$1.89 NT
Monessen, Penn.	1.51 GT	1.89 NT
Aliquippa, Penn.	1.62 GT	2.14 NT
Steubenville, Ohio	1.62 GT	2.14 NT
Youngstown, Ohio	1.62 GT	2.14 NT

(See Note 5.)

38160. **Talc tailings**, C. L., **soapstone**, ground or pulverized, other than soapstone, testing not less than 99 per cent through 200 mesh screen, C. L., soapstone, crude, not ground or pulverized (not blocks or slabs), C. L., min. wt. 70,000 lb., from Emeryville, Hailesboro and Natural Bridge, N. Y., to Keyport, N. J., 20c per 100 lb., in lieu of current sixth class rate. (See Note 5.)

Illinois

I. R. C. 3726-L. **Slag, clay**, etc., Danville, Ill., to various I. R. C. points. Establish on construction material aggregate, viz., expanded slag, clay or shale, C. L. (See Note 3), but not less than 80,000 lb. between points in C. F. A. territory, also between points in C. F. A. territory on the one hand, and points in I. F. A. territory on the other, rates based on the scale shown below (rates in cents per net ton):

20 miles and under		90
Over 20 miles and not over	35	100
Over 35 miles and not over	50	110
Over 50 miles and not over	65	120
Over 65 miles and not over	80	130
Over 80 miles and not over	100	140
Over 100 miles and not over	125	150
Over 125 miles and not over	150	160
Over 150 miles and not over	175	170
Over 175 miles and not over	200	180
Over 200 miles and not over	225	190
Over 225 miles and not over	250	200
Over 250 miles and not over	275	210
Over 275 miles and not over	300	220
Over 300 miles and not over	325	230
Over 325 miles and not over	350	240

The foregoing basis of rates to supersede all existing rates applicable on slag (light weight concrete aggregate) and on cinders, clay or shale; also rates on any other light weight concrete aggregates which have been authorized on basis of 80 per cent of the standard brick rates.

7429-2 (I. R. C.). **Sand** (except industrial), C. L., from Grand Tower, Ill. To Cambria, Ill., present 97, proposed 88; Carterville, Ill., present 97, proposed 88; Marion, Ill., present 111, proposed 88.

Southern

20234. **Phosphate rock**, C. L. Establish from Centreville, Tenn., district to Chicago, Ill., and Joliet, Ill., 372c; St. Louis, Mo., E. St. Louis, Ill., Cairo, Ill. Metropolis, Ill., Evansville, Ind., and Henderson, Ky. 282c net ton.

20242. **Ground limestone**, C. L. Establish 100c net ton, Crystal River and Lebanon, Fla., to Jacksonville, Fla. Truck competitive. Expires June 30, 1940.

20246. **Marble**, crushed, C. L. Cancel, as obsolete, rate of 406c net ton from Tate and Whitestone, Ga., to Belleville, Ill., St. Louis, Mo., and East St. Louis, Ill., for beyond. Class or combination rates to apply.

20270. **Lime, fluxing**, C. L., min. 70,000 lb. Establish 282c net ton, Erin, Tenn., to Newport, Ky.

20429. **Gypsum**, crude or crushed (not ground), C. L., min. 80,000 lb. Establish 9c cwt., Savannah and Port Wentworth, Ga., to Brunswick, Ga.

New England

M-3976. **Dry building mortar**, C. L., min. wt. 50,000 lb., from Great Notch, N. J. To Albany, N. Y., 14; Atlantic City, N. J., 14; Auburn, N. Y., 19; Bethlehem, Penn., 13; Binghamton, N. Y., 17; Brooklyn, N. Y., 9½; Buffalo, N. Y., 22; Hicksville, N. Y., 10; Jamaica, N. Y., 9½; Jersey City, N. J., 9; Long Island City, N. Y., 9½; Newark, N. J., 9; New York, N. Y., 9; Patchogue, N. Y., 12; Paterson, N. J., 9; Philadelphia, Penn., 12; Phillipsburg, N. J., 12; Pittsburgh, Penn., 22; Rochester, N. Y., 21; Rutherford, N. J., 9; Syracuse, N. Y., 19; Trenton, N. J., 10½; Wilkes-Barre Penn., 16.

(Rates in cents per 100 lb.). Reason: Comparable with rates on cement.

M-3977. **Dry building mortar**, C. L., min. wt. 50,000 lb., from Great Notch, N. J., to Boston, Mass., 21; Bridgeport, Conn., 16; Hartford, Conn., 17; New Haven, Conn., 17; Providence, R. I., 20; Springfield, Mass., 18; Worcester, Mass., 20.

(Rates in cents per 100 lb.). Reason: Comparable with rates on cement.

M-3978. **Dry building mortar**, C. L., min. wt. 50,000 lb., from Great Notch, N. J., to Chicago, Ill., 29; Chicago Heights, Ill., 29; Cincinnati, Ohio, 27; Cleveland, Ohio, 23; Detroit, Mich., 25.

(Rates in cents per 100 lb.). Reason: Comparable with rates on cement.

Southwestern

18119. **Stone**. Establish rate of 235c per ton of 2000 lb. on stone, consisting of irregular shaped pieces each weighing in excess of 200 lb., but not more than 20,000 lb.; also **riprap** in pieces ranging up to 200 lb., C. L., min. wt. as specified in paragraph (a), Item 60, S. W. L. Tariff 162-N, from Lone Star Spur, Tex., to Lake Charles, La.

18144. **Silica sand**, Guion, Ark., to Shreveport, La. Establish rate of $2.25 per ton of 2000 lb. on silica sand in closed equipment from Guion, Ark., to Shreveport, La.

18177. **Sand**, Webb City, Mo., to East St. Louis, Ill. Establish rate of $2.20 per ton of 2000 lb., min. wt. as per Item 60 of S. W. L. Tariff 162-N, on sand, (except asbestos and silica sand), C. L., from Webb City, Mo., to East St. Louis, Ill.

News of the Industry

Amsler-Morton Co., Pittsburgh, Penn., has established a department devoted exclusively to design, engineer, and supervise installation of complete pulverized coal units for furnaces of all types. The department will be under the direction of C. F. Herington, who has had extensive experience in the pulverized coal field for the past 20 years.

Blaw-Knox Co., Pittsburgh, Penn., has recently elected Lawrence E. Joseph, a director and vice-president of the company. He was recently appointed executive head of the Blaw-Knox Division.

Buda Co., Harvey, Ill., has appointed L. F. Shoemaker as sales manager of the Automotive and Industrial Division. He has been with the company in various capacities since 1920.

Morris Machine Works, Baldwinsville, N. Y., announces the appointment of M. H. Morris as president, J. L. Lonergan as vice-president and general manager, A. G. Forssell as second vice-president, and the reappointment of R. S. Mercer as secretary and treasurer. All of these officials have been associated with the company for many years. Mr. Lonergan's advancement follows more than 37 years of service, the last 25 of which have been in executive positions.

J. L. Lonergan

Atlas Powder Co., Wilmington, Del., reports that Ronald Henry Rennie, general manager, Giant division, Atlas Powder Co., on August 12th celebrated the anniversary of his fiftieth year of continuous service in the Explosives Industry. A testimonial banquet in his honor was held in San Francisco on the anniversary date. Mr. Rennie was born in England in 1872 and came to California at the age of twelve. He joined the Giant Powder Co. in 1889 as office boy and advanced to the position of president when Giant was acquired by Atlas in 1915. He assumed his present post when Giant merged with Atlas in 1933.

R. H. Rennie

R. S. (Bob) Montgomery is the name under which an imposter has been defrauding equipment manufacturers. He represents himself as an employee of Morrison-Knudsen Co., Inc., Boise, Idaho and purports to purchase equipment for this contractor, asking to have a check cashed for amounts ranging from $15.00 to $150.00. He has been described as follows: 32-35 years of age, 5'6"-5'8" tall, 150-160 lbs. in weight, rather dark-tanned-outdoor complexion, square head, square jaw, a small scar directly under point of his chin and a large scar behind his right elbow.

Link-Belt Co., Chicago, announces the retirement of Richard W. Yerkes as secretary - treasurer after being with the company since 1890. He will, however, continue to serve as a member of the board of directors. Harry E. Kellogg succeeds Mr. Yerkes as treasurer. He has successively held the positions of plant accountant, general credit manager, and chief accountant. P. V. MacArthur, formerly assistant treasurer, has been elected secretary, Melbourne P. Anderson, formerly general credit manager, has been appointed chief accountant to succeed Mr. Kellogg, and C. W. Marum succeeds Mr. Anderson.

Harry E. Kellogg

Commercial Shearing and Stamping Co., Youngstown, Ohio, is erecting a new building 70- x 180-ft. for production and warehouse purposes. Walls, 15-ft. high, are of concrete block and glass with the steel frame on concrete foundations.

New Incorporations

Dixie Crushed Stone Co., Bowling Green, Ky., with capital stock of $2000, has been granted a charter. Incorporators are Charles F. and Arthur D. Gorman and James C. McClellan.

Georgia Sand and Stone Co., Cartersville, Ga., has filed articles of incorporation. Capital stock is $200 and authorized stock of 2000 shares of common stock with no par value and 500 shares of preferred stock of $100 par value. Incorporators are W. S. Rogers, Bruce F. Rogers, and M. L. Blair.

Calhoun Lime Co., Cameron, is the name of a new South Carolina corporation with a capital of $5,000. W. A. Rast is president, J. M. Ross, vice-president, and George D. Rast, secretary and treasurer.

Slate Products, Little Rock, Ark., recently filed articles of incorporation. The company starts with $25,000 paid in capital and with authorized capital stock of 3000 shares common, having no par value, and 750 shares preferred, having a par value of $100 each. Incorporators are H. Roddy Jones, R. M. Traylor and Fred A. Donham.

Newburgh Sand, Stone & Gravel Corp., Newburgh, N. Y., has been granted a charter with 200 shares no par value. Raphael A. Egan is incorporator.

Waveland Stone Co., Inc., Waveland, Ind., has been granted a charter with a capital of 1000 shares no par value. Incorporators are Courtney W. Dice, Ward S. Williams and Edward H. O'Brien.

Concrete Builders, Inc., San Antonio, Tex., has been incorporated by Gray Harrington and Lloyd Harrington.

Montello Quarries, Inc., Montello, Wis., has been granted a charter with a capital of 150 shares at $10 each. L. H. and Winifred Bancroft and Lorin L. Kay are incorporators.

Farm Lime Co., Inc., Richmond, Va., has been granted a charter with maximum capital of 100 shares no par value. Edmund M. Preston is president.

To Build Stone Plant

JOSEPH BANKS CONSTRUCTION CO., Wilkes-Barre, Penn., has leased a tract of land east of Nesquehoning from the Lehigh Navigation Coal Co. for erection of a stone-crushing plant. It is planned to erect a crushing unit which will have an annual output of 50,000 tons. The stone is known as Pocono sandstone or Mauch Chunk red rock.

Lime Plants Are Busy

THE BLUFF CITY LIME AND STONE CO., Ste. Genevieve, Mo., has been operating at full capacity, and reports indicate that other companies in this area are equally busy. This company recently bought the Western Lime plant, but does not plan to operate it.

UNION LIME CO., near Republic, Wash., has resumed operation after a shut down of several months. Austin Ward, president and general manager, reports several large orders to fill. While the plant was down several changes were made to increase efficiency.

DOBLASUE LIME & MINING CO., Republic, Wash., shut down temporarily with bins full.

New Cement Mill for India

PATIALA CEMENT CO., LTD., subsidiary of the Associated Cement Cos., Ltd., India, recently opened up its new Bhupendra Cement Works. A 7-mile aerial cableway, said to be the longest in India, connects the mill to the quarry. Capacity is approximately 100,000 tons per year.

Settle Texas Cement Suit

FOUR CEMENT COMPANIES in Texas have agreed to pay $400,000 in penalties and court costs and "be enjoined from creating or becoming a part of any combination for the purpose of restricting competition in the sale or manufacture of their product." The companies named in the suit are Lone Star Cement Corp., the Southwestern Portland Cement Co., the Trinity Portland Cement Co., and the Universal Atlas Cement Co.

The State alleged the companies had violated State anti-trust laws by forming a combination to fix prices and establish a set method of sale and distribution of cement, thereby preventing free and unrestricted competition. The attorney general's petition had asked penalties of from $50 to $1,500 a day for violations.

An injunction will be made permanent when judgment is entered in a similar suit now on file by the State against the San Antonio Portland Cement Co., and the Longhorn Portland Cement Co., seeking forfeiture of their charters and the assessment of penalties for alleged violation of State anti-trust laws.

Rebuild Gravel Plant Near Sioux Rapids

HALLETT CONSTRUCTION CO., Crosley, Minn., has been rebuilding the plant operated by the Lakeview Gravel Co., near Sioux Rapids, Iowa. It has the contract to provide gravel for bridges and structures on the new road being built from Linn Grove north to Highway 10.

Cut Arkansas Rates on Sand and Gravel

REDUCTIONS ranging from 20 to 35 percent on freight rates covering intrastate shipments of sand, gravel, crushed stone, chat and chat sand became effective in Arkansas on October 1. The rates at present apply only to intrastate shipments, but T. E. Wood of the Arkansas Corporation Commission is reported to have said that the I.C.C. will be asked to permit the same rates on interstate business from Arkansas to Oklahoma, Missouri and Kansas.

Tennessee Phosphate Sales Holding Up

SHIPMENTS OF PHOSPHATE rock from the Tennessee area are holding up at a better rate of tonnage than for previous years due to the drouth in August and September which held up deliveries for agricultural purposes. Prices in all lines are beginning to harden, and in some cases to advance decidedly. On November 18, the remaining lands of the old Consolidated Phosphate Co. will be sold.

New Stone Plant

ROMESBERG STONE CO., Garrett, Penn., is the name of a new crushed stone company which was set up to supply material for the Pittsburgh-Harrisburg Turnpike. It is reported that a second Seco screen has been added to the plant equipment to take care of additional contracts for this project.

Increase Capacity of Texas Cement Plant

THE LONE STAR CEMENT CORP. has a $150,000 modernization program for the Manchester Switch, Texas, plant. These improvements include a raw material storage bin, 80- x 240-ft. and one-story high, of reinforced concrete with a superstructure of steel; an unloading arrangement for handling shell from barges to bins; and a clinker storage silo addition, 30-ft. in diameter and 50-ft. high.

Tractor truck with semi-trailer is used by the Washington-Idaho Lime Products Co. to haul a gross load of 58,000 lb. of cement

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

New York Trap Rock, pfd.	$1.75	Oct. 2
Northwestern States Portland Cem.	.15	Sept. 30
Pacific Portland Cement Co., pfd.	1.50	Oct. 15
Riverside Cement Co., pfd.	1.50	Nov. 1
Schumacher Wall Board, pfd.	1.00	Nov. 15
Westvaco Chlorine Prod., pfd.	.37½	Nov. 1

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NATIONAL GYPSUM CO., Buffalo, N. Y., boosted its net income to $519,339 for the third quarter as compared with $355,505 for a like period in 1938. Sales during July and August ran substantially ahead of the like months of 1938, and volume and profits in August have been at the highest point in the history of the company. The outlook for the final three months of the year is considered good. In the first half of the year, sales represented an advance of 35 percent over the corresponding 1938 period. The company also reported that it is concluding arrangements for the bond issue of $5,000,000, previously reported.

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YOSEMITE PORTLAND CEMENT CORP., Merced, Calif., has extended the time for conversion of the class A common stock into preferred stock to December 31, 1939, inclusive.

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PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., reports for the 12 months ended September 30, 1939, a profit of $355,011 after depreciation, depletion, interest, etc., but before federal income taxes, comparing with a loss of $43,213. The comparative report for the year ending September 30, 1939, follows:

	1939	1938
Net sales	$6,047,850	$5,957,750
Costs, exp., ord. tax, etc	4,825,749	5,054,489
Depr. and depl.	‡489,305	530,931
Oper. profit	$732,796	$372,330
Other income	32,922	29,380
Total income	$765,718	$401,710
Interest	410,707	444,923
*Profit	$355,011	†$43,213

*Before federal income taxes. †Loss. ‡Total depletion and depreciation charges amounted to $1,261,100, of which $489,305 (basis for present federal income tax purposes) was charged to operations. The balance $771,795 was charged to special reserve.

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ALPHA PORTLAND CEMENT CO., Easton, Penn., has announced consolidated earnings for the year ended September 30, 1939, as follows:

	1939	1938
Net sales	$7,181,123	$5,807,972
Oper. expenses	5,363,067	5,056,882
Depr. & depl.	950,781	754,020
Operating profit	867,275	d 2,930
Other income	116,303	133,605
Total income	983,578	130,675
Income charges	39,576	37,016
Fed. tax.	134,232	cr 16,208
Net profit	809,769	109,867
Common divs.	639,500	641,000
Surp. for periods	170,269	d 531,133

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BESSEMER LIMESTONE & CEMENT CO., Youngstown, Ohio, will redeem its outstanding six percent gold bonds at its home office at par and accrued interest on January 1, 1940. At the end of September, $687,850 par value bonds were outstanding. The bonds will be redeemed partly with the proceeds of a bank loan and from cash

in the treasury. G. G. Treat, president, is quoted as stating that business of the company this year is ahead of last year. The plant is operating at about 50 percent of capacity.

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ARUNDEL CORP., Baltimore, Md., reports a net profit of $133,616 in August, 1939, as compared with $119,756 for the same month a year ago. Earnings for eight months in 1939 were $914,421 as compared with $899,909 in the same period in 1938. Current assets are $3,433,589 as against current liabilities of $827,233.

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LEHIGH PORTLAND CEMENT CO., Allentown, Penn., had a net profit of $2,062,255 for the 12 months ended September 30, 1939. This compares with $487,232 for a like period in 1938. Earnings for the year ending September 30, 1939, are equal to $2.43 a common share.

PRICES BID
Contracts Let

PITTSBURGH, PENN.: Diamond Portland Cement Co., Middle Branch, Ohio, and Standard Portland Cement Co., Cleveland, will share the $233,600 order for 120,000 bbl. of cement for the new Loyolhanna flood control dam near Saltsburg. Thirteen cement manufacturers quoted the same price of $1.93 a bbl. for bulk quantities and $2.13 a bbl. in sacks, delivered. As a result of the identical bids the contract was split among two of the 13 bidders by pulling their names out of a hat.

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SHEFFIELD, ALA.: Birmingham Slag Co., Birmingham, has been awarded the contract for concrete aggregates and earth embankment blanket gravel for delivery to the TVA at Watts Bar Dam within two years, with a bid of approximately 70c per ton. The material is to be dredged from the Tennessee River bed and will consist approximately of 270,000 tons of sand, 200,000 tons of coarse gravel, 235,000 tons of medium gravel, and 240,000 tons of fine gravel for concrete purposes, and approximately 54,000 tons of blanket gravel.

Three 2-cu. yd. tilting concrete mixers for installation at the Watts Bar Dam concrete mixing plant will be supplied by T. L. Smith Co., for $15,717, and three 3-cu. yd. tilting concrete mixers to be used at the Kentucky Dam concrete mixing plant will be supplied by Wilson-Weesner-Wilkinson Co., Knoxville, Tenn., for $23,025.

Start Up Cement Mills

THE ASH GROVE LIME & PORTLAND CEMENT CO. plant at Chanute, Kans., which had closed on August 19, resumed operations September 28 under partial capacity.

LAWRENCE PORTLAND CEMENT CO., Allentown, Penn., started up on October 1, after having been closed a month.

LONE STAR CEMENT CORP., Hudson, N. Y., closed temporarily for the purpose of making alterations in its quarry haulage system and other changes. The plant at Demopolis, Ala., also was closed temporarily for the purpose of making repairs and installing new machinery, but it was expected that operations would resume about October 1. At the Bonner Springs, Kans., plant operations were resumed after a new finish tube mill had been installed.

New Plant

GRANT-PACIFIC ROCK CO., Fresno, Calif., is centralizing its ready-mixed concrete, hot mix and mortar operations at Fresno under one roof in a new plant. It is said that the new plant, when complete, will be one of the most modern layouts for handling and dispatching these products in the state. A. R. McMillan is general manager.

Magnesite Plant Is Busy

NORTHWEST MAGNESITE CO., Chewelah, Wash., is working quarries and kilns at full capacity to meet the demands for its product resulting from war orders. About 400 men are employed.

Form Company to Supply Granite Rip-Rap

THE LITTLE ROCK GRANITE CO., Little Rock, Ark., has been organized by R. S. Wilson, Sr., and associates to operate a large granite quarry southeast of Little Rock. Granite blocks, averaging about 8 tons each, will be shipped to Lake Charles, La., where they will be used by the federal government in the construction of two huge stone jetties. Approximately 3000 carloads will be taken from the quarry. In addition to Mr. Wilson, the other officers of the corporation include: G. C. McCulloch, Birmingham, Ala., vice-president; R. S. Wilson, Jr., secretary, and C. B. Ireland, Birmingham, treasurer.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912 and March 3, 1933

Of ROCK PRODUCTS, published monthly at Chicago, Illinois, for October 1, 1939.

State of Illinois, County of Cook, ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Geo. C. Williams, who, having been duly sworn according to law, deposes and says that he is the Business Manager of Rock Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management(and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher—Tradepress Publishing Corporation, 205 W. Wacker Drive, Chicago, Ill.

Editor—Nathan C. Rockwood, 205 W. Wacker Drive, Chicago, Ill.

Managing Editor—Ralph S. Torgerson, 205 W. Wacker Drive, Chicago, Ill.

Business Manager—George C. Williams, 205 W. Wacker Drive, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Tradepress Publishing Corporation, 205 W. Wacker Drive, Chicago, Ill.; Julius L. Frazier, 2043 Orrington Ave., Evanston, Ill.; Horace T. Hunter, 522 Fifth Ave., New York, N. Y.; George C. Williams, 2052 N. Lincoln Pk. W., Chicago, Ill.; MacLean Publishing Company, 481 University Ave., Toronto, Ontario; Herbert V. Tyrrell, 221 Dunvegan Road, Toronto, Ontario.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is: (This information is required from daily publications only.)

GEO. C. WILLIAMS,
Business Manager.

Sworn to and subscribed before me this 4th day of October, 1939.

(Seal) FLORENCE L. PRINCE.

(My commission expires May 14, 1940.)

OBITUARIES

JOSEPH H. PUGH died September 28 at the age of 41. He was formerly superintendent of operations at the Volunteer Portland Cement Co. plant at John Sevier, Tenn.

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GUS LUNDBERG, retired superintendent of the Alpha Portland Cement Co., LaSalle, Ill., plant, died September 22. Born on August 12, 1868, at Malmo, Sweden, he came to the United States when 18 years of age and had been superintendent of Alpha's LaSalle plant from 1900 until his retirement because of ill health two and one-half years ago.

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CAPTAIN EDWARD T. SLIDER, founder and president of E. T. Slider, Inc., New Albany, Ind., died October 4. He was 73 years of age and had been identified with the sand and gravel industry for many years. He started as a team driver, then bought his father's transfer company. As his business activities grew he entered the aggregates industry in 1895 when he built a sand dredge and a line of barges. Later he organized E. T. Slider Co. in Louisville and in 1922 formed the Tell City Sand & Gravel Co.

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C. H. ATKINSON, president of the Watertown Cement Products Co., Watertown, S. D., and the Atkinson Paving Co., Chillicothe, Mo., died September 26 at the age of 70. Born in Salem, Ohio, in 1868 he attended college at Alliance, Ohio. Shortly after 1903 he joined the Watertown Cement Products Co., and two years later purchased the company. In 1911 he organized the Atkinson Paving Co. He also aided in organizing the Associated Contractors of South Dakota and served as one of its first presidents.

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FRED L. MAUNTLER, vice-president and one of the original directors of the Ohio Hydrate and Supply Co., Woodville, Ohio, passed away September 9 at the age of 68.

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JOHN KAMINSKA, chief engineer for the Fredonia, Kan., plant of Consolidated Cement Co., for the past seven years, passed away September 19. He was 57 years of age and had been an employe of the Consolidated company for 25 years as an engineer. At one time he was chief engineer of the power house and construction superintendent of the Cement City, Mich., plant. After seven years in Cement City he was sent to Tampa, Fla., where he held a like position in construction of the Florida Portland Cement Co.'s plant. In 1932 he was transferred to Fredonia.

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JAMES WESSON KITTRELL, pioneer in the cement industry in Catskill, N. Y., and said to have built the first cement plant along the Hudson River, died in New York, October 3. He came to Catskill in 1898 and formed the Catskill Cement Co. Mr. Kittrell had been in Rome with the Stanwix Engineering Co., and his interest in the cement industry brought him to Catskill. Several years after the Catskill company was sold to the Alpha Portland Cement Co. in 1909, Mr. Kittrell took over the management of the Lehigh Portland Cement Co. plant at Alsen.

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E. L. NEWBIGIN, former trustee of the David Mitchell Estate, a lime company in Melbourne, Australia, passed away last March, it has been recently learned. He made many American friends in the industry when he was an honored guest at the 1938 National Lime Association convention.

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J. H. HEERENS died October 10 in an Evanston, Ill., hospital. He was 57 years of age and had been connected with the Pennsylvania-Dixie Cement Corp., for the past 12 years in Atlanta, Ga., and in Chattanooga before that.

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THADDEUS MERRIMAN, consulting engineer to the Board of Water Supply of New York City and formerly its chief engineer, died September 26. For many years he has made a special study of portland cement and the phenomena of hydraulic flow. In doing this he contributed extensively to research studies of both the American Society of Civil Engineers and the American Society for Testing Materials. He served as editor-in-chief for the American Engineers Handbook and was author of other engineering texts. Born in New Haven, Conn., in 1876 he spent some time after graduation from Lehigh University in 1897 on the staff of the Nicaragua Canal Commission. In 1905 he joined the staff of the New York Board of Water Supply and continued actively in the service of that board until his retirement from the position of chief engineer in 1933. In recent years he has served on numerous consulting boards. The specifications for portland cement now used by the Board of Water Supply of the City of New York were prepared under his direction. Mr. Merriman also was a valued contributor of articles in ROCK PRODUCTS.

Large Stone Contract For Canal Job

R. NEWTON MCDOWELL, INC., Kansas City, Mo., operator of several crushed stone plants in Missouri, has obtained a big contract for stone to be used in connection with the Coachella section of the All American Canal under the Morrison-Knudsen contract. An office has been opened in Brawley, Calif., to be used in connection with this contract as it is expected to last two years.

Propose Long Conveyor For Shasta Dam

TO TRANSPORT sand and gravel from the plant at Redding, Calif., to the Shasta damsite, it has been proposed to use a belt conveyor system 49,000 ft. long to replace delivery by rail previously contemplated. The plan is favored by Pacific Constructors, Inc., and contractors for the aggregates, Columbia Construction Co., Inc. If a belt conveyor system is used, between 21 and 25 flights would be required with a belt width of 36-in., to provide a capacity of 1000 tons per hour.

More Storage Facilities For Alpha

ALPHA PORTLAND CEMENT CO., Easton, Penn., has let a contract to Nicholson Co., New York, for expansion of storage facilities, including bin units and auxiliary equipment. The cost will run close to $100,000.

Trends as Evidenced By Purchases

MANITOWOC ENGINEERING WORKS, Manitowoc, Wis., has advised that orders have been received for six Vanderwerp recuperators, five of which are of the latest type F design. All recuperators represent repeat orders and one is for shipment abroad.

SCREEN EQUIPMENT CO., Buffalo, N. Y., has reported the following installations of Seco screens: Bituminous Limestone Co., Hillsboro, Ohio; Brewer & Brewer, Chillicothe, Ohio; Joseph S. Boero, Springfield, Mass.; Central States Engineering Co., Lowellville, Ohio; Churchill, Inc., Lima, Ohio, 3½ deck in portable asphalt plant; T. J. Hogan, Cortland, N. Y.; Frontier Bituminous Materials Corp., in a new plant at Lockport, N. Y.; Gravel Products Co., Buffalo, N. Y., replaced two vibrating screens with a triple deck unit; Maryland Slag Co., Sparrows Point, Md., replaced two vibrating screens with a 5- x 12-ft. double deck unit; Pekin Stone Products Corp., Lockport, N. Y.; Permanente Corp., Permanente, Calif., have installed a heavy-duty 5- x 10-ft. double deck unit; J. R. Rhodes, Caldwell, Idaho; Ralph Rogers Co., Greensburg, Ind., have installed a 4 x 8-ft. scalping screen.

Large Order of Slurry Pumps

THE PERMANENTE CORP. cement mill how under construction near San Jose, Calif., because of its flowsheet and the use of flotation, will do more slurry pumping than any other wet-process cement plant on record. There are 22 slurry pumps, most of which are Wilfley, to handle raw materials in various stages of treatment, including delivery to the kiln feeders. These range from 3-in to 8-in. in size.

Construction progress of the entire project is well on schedule, according to latest reports, and it is expected the plant will be completed on time to start manufacture of 5,800,000 bbl. of Portland cement for Shasta dam. The proposed lime plant is to be finished later.

Rust Engineering Co., Pittsburgh, Penn., contractor for construction of the cement storage silos, has completed this unit, comprising 27 concrete silos and 16 interstice bins, totalling 500,000 bbl. capacity, after a record pour. A total of 12,000 cu. yd. of concrete was required.

The 275-ft. concrete stack is finished, two miles of spur track have been laid into the plant, the quarry has been opened, conveyors completed. Other completed units are the administration building, laboratory and sugar rock plant.

Santa Cruz To Build Two Lepol Kilns

SANTA CRUZ PORTLAND CEMENT CO., Santa Cruz, Calif., has started an extensive construction program which will include the installation of two Lepol kilns and the construction of eight more silos. The new silos, which will be 24 ft. in diameter and 70 ft. high, are for raw storage, and will be in addition to 10 silos now in service.

Concrete Pavement Yardage

AWARDS of concrete pavement for September, 1939, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. Yds. awarded during Sept.	Total sq. yds. during first nine months
Roads	3,058,183	22,908,537
Streets and alleys	1,406,542	14,708,106
Airports	73,700	632,876
Totals	4,538,425	38,249,519

Large Rip Rap Order

BASALT ROCK CO., INC., Napa, Calif., has been awarded a contract for approximately 625,000 tons of rip rap by the Bureau of Yards and Docks, Navy Department, Washington, D. C., for seawall construction at the Alameda Naval Base near Oakland, Calif. George Pollock Co., Sacramento, has the general contract for the entire project construction, dredging and fill, etc., and the rip rap contract is a sub contract quoted at $759,430.

Delivery of the rock, of three types, core, armor and cap, is to be made in place in 720 calendar days after notice is presented. Rock, for the bulk contract, will be delivered into place by the Basalt Rock Co., with self-unloading barges of the type developed to serve a previous contract, and floating cranes will be used for placing cap and armor rock.

Aside from the usual requirement that the core rock be free from deleterious substances, etc., it is specified that the rock shall all pass a 24-in. grizzly of such shape and grading that, when placed, it will form a tight, compact core.

Armor and cap rock are required to be roughly cubical or angular with the least dimension of any piece to be not less than one-third the greatest. Armor stone are to weigh not less than one ton and at least 50 percent are to weigh more than two tons. Cap rock pieces are to weigh not less than two tons and at least 50 percent will weigh more than three tons. It is further stipulated that the individual rocks shall provide fairly even surfaces and be fixed firmly in position in an approved manner with the finished cap and outboard face of the wall equalling in workmanship and alignment the existing jetty of the lagoon.

The company proposes quarrying the core rock at Point Richmond, Calif., and will build a plant to load barges by belt conveyor using a hopper and pan feeder ahead of the belt. To deliver stone two all steel self-unloading barges, with a capacity of 550 tons each, are under construction in addition to one barge of 450 tons which already has been used in that type of work. These barges are of original design (see ROCK PRODUCTS, February, 1939, p. 83).

The company has recently substituted, for trucks, at its Healdsburg, Calif., sand and gravel plant two Euclid self-unloading bottom-dump "trak-truks," which carry 12-cu. yd. water level. These units will likely be moved to Point Richmond to haul rip rap stone to the field hopper which will be set up.

Cement Shipments Up

BUREAU OF MINES reports that the portland cement industry in August, 1939, produced 12,369,000 bbl., shipped 13,804,000 bbl., from mills and had in stock at the end of the month 20,926,000 bbl. Production and shipments in August, 1939, showed increases of 12.4 and 16.8 percent, respectively, as compared with August, 1938. Stocks at mills were 7.1 lower than a year ago. The reports for August, 1939, cover all manufacturing plants.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 161 plants at the close of August, 1938 and 1939.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	August 1938	August 1939	July 1939	June 1939	May 1939
The Month	50.4	56.6	57.9	56.5	50.9
12 Months	40.4	45.5	45.0	44.3	43.8

Sand Lime Brick Production and Shipments

NINE active sand-lime brick plants reporting for September and eight for August, statistics for which were published in October.

AVERAGE PRICE FOR SEPTEMBER

	Plant Price	Delivered Price
Detroit, Mich.	....	$16.00
Madison, Wis.	....	13.00
Milwaukee, Wis.	$10.00	12.50
Mishawaka, Ind.	11.00	....
Saginaw, Mich.	10.90	....
Seattle, Wash.	14.50	16.50
Syracuse, N. Y.	14.00	16.00 20.00

STATISTICS FOR AUGUST AND SEPTEMBER

	August†	September‡
Production	2,736,165	2,056,520
Shipments (rail)	241,000	409,000
Shipments (truck)	2,732,395	1,974,915
Stock on hand	1,179,831	550,376
Unfilled orders	1,595,000	990,000

† Eight plants reporting: incomplete one not reporting production, one not reporting stock on hand, and six not reporting unfilled orders.

‡ Nine plants reporting: incomplete, one not reporting production, four not reporting stock on hand, and four not reporting unfilled orders.

Giant Portland Cement Wins Safety Award

GIANT PORTLAND CEMENT CO., Egypt, Penn., won the safety monument of honor for the completion of a program of safety over an eight-year period. At the recent celebration of the award, A. J. R. Curtis, assistant general manager of the P.C.A., presented the trophy, and Charles F. Conn, president of the company, accepted the award. O. D. Havard, general superintendent, paid a tribute to the men who had made the record possible, and Stanley Lutz, superintendent of the plant, acted as master of ceremonies.

Classified Directory of Advertisers

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Smith Engineering Works
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers Reduction
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Jeffrey Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing Rolls
Austin-Western Road Machy. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.

Classified Directory (Cont.)

Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Rogers Iron Wks. Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing & Screening Plants (Portable)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Diamond Iron Works, Inc.
Dixie Machy. Mfg. Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Rogers Iron Wks. Co.
Smith Engr. Works
Traylor Engr. & Mfg. Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Dedusters
Blaw-Knox Co.

Dehydrators
Pioneer Engineering Works, Inc.

Derricks
Hayward Co.

Detonators
Ensign-Bickford Co.
Hercules Powder Co.

Dewatering Equipment
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Diaphragms (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel)
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Koehring Co.
Link-Belt Co.

Disintegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Link-Belt Co.

Dragline & Cableway Excavators
American Cable Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Pioneer Engr. Works, Inc.
Sauerman Bros., Inc.
Wickwire-Spencer Steel Co.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Works
Hetherington & Berner, Inc.

Dredge Hulls
Eagle Iron Works

Dredges
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc.
Link-Belt Co.

Dredge Sleeves
Hetherington & Berner, Inc.

Drilling Accessories
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drill Bits
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drill Sharpening Machines
Bucyrus-Erie Co.

Drills (Blast Hole)
Bucyrus-Erie Co.

Drills (Rock)
Bucyrus-Erie Co.
Jeffrey Mfg. Co
Timken Roller Bearing Co.

Drills (Well)
Bucyrus-Erie Co.

Drives (Belt Chain & Rope)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short-Center)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Combustion Engr. Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Buell Engineering Co., Inc.
Raymond Pulverizing Div.
Smidth, F. L., & Co.
Sturtevant Mill Co.

Dust Collecting Bags
Blaw-Knox Co.

Dust Conveying Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Fuller Co.
Raymond Pulverizer Div.

Dynamite
Hercules Powder Co.

Electric Cables
General Electric Co.

Electric Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Hayward Co.

Electric Motor Starters
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevators
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chicago Steel Fdry. Co
Diamond Iron Works, Inc.
Eagle Iron Works
Fuller Co.
Gay, Rubert M., Div.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.
Pioneer Engineering Works, Inc.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., & Co.
Smith Engineering Works
Sturtevant Mill Co.

Classified Directory (Cont.)

Traylor Engr. & Mfg. Co.
Universal Road Machinery Co.
Williams Patent Crusher & Pulv. Co.

Engineers (Designing & Consulting)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., & Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gas, Kerosene & Oil)
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

Engines (Natural Gas)
Allis-Chalmers Mfg. Co.

Engines (Steam)
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

Exhausters
Combustion Engr. Co.
Raymond Pulverizer Div.

Explosives
Hercules Powder Co.

Fans
Blaw-Knox Co.
General Electric Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.

Feeders
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M., Div.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Kent Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Road Machinery Co.

Filter Cloth
Roeblings, John A., Sons Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.

Forgings
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Laughlin, Thomas, Inc.

Frogs & Switches
Easton Car & Construction Co.
Frog, Switch & Mfg. Co.

Fuels (Diesel)
Texas Co.

Furnaces (Heat Treating, Electric)
General Electric Co.

Fuse Cutouts
General Electric Co.

Fuse Cutters
Ensign-Bickford Co.

Fuse Lighters
Ensign-Bickford Co.

Fuses (Detonating & Safety)
Ensign-Bickford Co.
Hercules Powder Co.

Fuses (Electric)
General Electric Co.

Galvanometers
General Electric Co.
Hercules Powder Co.

Gaskets
Goodyear Tire & Rubber Co.

Gasoline
Gulf Refining Co.
Texas Co.

Gas Producers
Blaw-Knox Co.

Gear-Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Link-Belt Co.

Gears
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Frog, Switch & Mfg. Co.
General Electric Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Generator & Motor Generator Sets
Allis-Chalmers Mfg. Co.
General Electric Co.
Nordberg Mfg. Co.

Glass Sand Equipment
Lewistown Fdry. & Mach. Co.

Grapples
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Owen Bucket Co.

Grating
Blaw-Knox Co.
Eagle Iron Works

Grease
Bacon, Earle C., Inc.
Gulf Refining Co.
Texas Co.

Grease Cups
Link-Belt Co.
Robins Conveying Belt Co.

Guards (Machinery)
Harrington & King Perf. Co.
Tyler, W. S., Co.

Guns
Hetherington & Berner, Inc.

Gypsum Plants
Traylor Engr. & Mfg. Co.

Hangers, Anchors & Inserts (Concrete)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Haulage Systems (Electric)
General Electric Co.
Jeffrey Mfg. Co.

Haulage Systems (Remote Control)
Dempster Bros.
General Electric Co.
Koehring Co.

Heaters (Bitumen)
Easton Car & Construction Co.

Hoists (Chain, Electric, Skip, Portable, Air, etc.)
Allis-Chalmers Mfg. Co.
Besser Mfg. Co.
Commercial Shearing & Stamping Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Easton Car & Construction Co.
Gay, Rubert M., Div.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Road Machinery Co.

Hoppers
Austin-Western Road Machy Co.
Besser Mfg. Co.
Blaw-Knox Co.
Gay, Rubert M., Div.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks., Inc.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Traylor Engr. & Mfg. Co.
Universal Road Machinery Co.

Hose (Air, Drill, Water, Steam, Sand Suction & Discharge)
Dixie Machinery Co.
Goodyear Tire & Rubber Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.

Classified Directory (Cont.)

Hydrators
Blaw-Knox Co.
Traylor Engr. & Mfg. Co.

Jigs (Sand & Gravel)
Allis-Chalmers Mfg. Co.
Traylor Engr. & Mfg. Co.

Joists & Slab Machines (Concrete)
Besser Mfg. Co.

Kiln Burners
Smidth, F. L., & Co.

Kiln Chain Systems
Smidth, F. L., & Co.

Kiln Liners
Traylor Engr. & Mfg. Co.

Kiln Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Steel Foundry Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Kilns (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Kilns (Vertical)
Blaw-Knox Co.

Kominuters
Smidth, F. L., & Co.

Laboratory Apparatus
Ransome Concrete Machinery Co.
Smidth, F. L., & Co.

Lift Trucks
Besser Mfg. Co.

Lime Handling Equipment
Combustion Engr. Corp.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Lime Plants
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Blaw Knox Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Loaders (Boat)
Fuller Co.
Link-Belt Co.

Loaders (Box Car)
Barber-Greene Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Loaders (Car, Truck, Bin & Hopper)
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M., Div.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Universal Road Machinery Co.

Loaders (Underground)
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

Locomotive Stack Netting
Tyler W. S., Co.

Locomotives (Diesel-Electric)
Lima Locomotive Works (Loco. Div.)

Locomotives (Electric, Trolley & Storage Battery)
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotives (Gasoline & Gas-Electric)
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Wks., Inc. (Loco. Div.)

Locomotives (Kerosene)
Lima Locomotive Works, Inc. (Loco. Div.)

Locomotives (Oil & Oil-Electric)
General Electric Co.

Locomotives (Steam)
Lima Locomotive Works, Inc. (Loco. Div.)

Lubricants
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co.

Machine Shop Equipment
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Magnetic Separators
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Magnets
General Electric Co.

Manganese Steel Parts
Bacon, Earle C., Inc.
Dixie Machy. Mfg. Co.
Frog, Switch & Mfg. Co.

Material Handling Equipment
Austin-Western Rd. Machy. Co.
Barber-Greene Co.
Diamond Iron Works, Inc.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.

Measuring Devices
Blaw-Knox Co.
Fuller Co.
Jaeger Machine Co.
Schaffer Poidometer Co.

Mechanical Rubber Goods
Goodyear Tire & Rubber Co.

Mill Liners
Allis-Chalmers Mfg. Co.
Dixie Machy. Mfg. Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mill Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mills, Grinding (Ball, Compartment, Emery, Hammer, Pug, Rod, Roll, Tube, etc.) (See Pulverizers also)
Allis-Chalmers Mfg. Co.
American Pulverizing Co.
Dixie Machinery Mfg. Co.
Jackson & Church Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Machy. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Mortar Mixers
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machinery Co.

Nozzles (Washing)
Link-Belt Co.

Oil Burners
Smidth, F. L., & Co.

Oils (Cutting)
Texas Co., The

Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co., The

Outdoor Lighting Equipment
General Electric Co.

Packers
Modern Valve Bag Co.
Smidth, F. L., & Co.

Packing
Goodyear Tire & Rubber Co.

Pallets (Steel & Wood)
Anchor Concrete Machy. Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Commercial Shearing & Stamping Co.
Multiplex Concrete Machy. Co.

Classified Directory (Cont.)

Pans, Grinding (Wet & Dry)
Eagle Iron Wks.
Jackson & Church Co.
McLanahan & Stone Corp.
Traylor Engr. & Mfg. Co.

Perforated Metal
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perf. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Son, Inc.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Pinions
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co., The
General Electric Co.
Jeffrey Mfg. Co., The
Link-Belt Co.

Pipe
Frog, Switch & Mfg. Co., The
Hetherington & Berner, Inc.

Pipe Fittings
Hetherington & Berner, Inc.

Pipe, Forms & Machine (Concrete)
Besser Mfg. Co.
Universal Concrete Pipe Co.

Plaster Mixers
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machinery Co.

Plaster Plants
Koehring Co.

Poidometers
Schaffer Poidometer Co.

Pontoons
Diamond Iron Works, Inc.
Eagle Iron Wks.

Powder (Blasting)
Hercules Powder Co.

Powder Magazines
Hercules Powder Co.

Power Transmission Machinery
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co., The
Link-Belt Company
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Timken Roller Bearing Co.

Power Units
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

Pulleys
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.

Pulverizer Parts
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Dixie Machinery Mfg. Co.
Frog, Switch & Mfg. Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.

Pulverizers (Hammer, Ring, Rod & Roll) (See also Mills & Crushers)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Combustion Engr. Corp.
Dixie Machy. Corp.
Gay, Rubert M., Div.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div. Sturtevant Mill Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Universal Road Machinery Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Diaphragm)
Jaeger Machine Co.

Pump Valves (Dry Pulverized Material)
Fuller Co.

Pumps (Dredge)
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Hetherington & Berner

Pumps (Dry Pulverized Material)
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Slurry)
Allis-Chalmers Mfg. Co.
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

Pump, Slurry, Valves
Fuller Co., The
Wilfley, A. R., & Sons, Inc.

Pumps (Vacuum)
Allis-Chalmers Mfg. Co.
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Water)
Allis-Chalmers Mfg. Co.
Jaeger Machine Co.

Railway Equipment
Easton Car & Construction Co.
General Electric Co.

Railways (Electric)
General Electric Co

Rectifiers
Allis-Chalmers Mfg. Co.
General Electric Co.

Recuperators
Traylor Engr. & Mfg. Co.

Refractories
Smidth, F. L., & Co.

Regulators (Voltage)
Allis-Chalmers Mfg. Co.
General Electric Co.

Rewashers (Screw)
Eagle Iron Works
Link-Belt Co.
Smith Engr. Wks.

Rheostats
General Electric Co.
Hercules Powder Co.

Roofing
Ryerson, Jos. T., & Son, Inc.
Texas Co., The

Rope (Transmission)
Allis-Chalmers Mfg. Co.

Sand Drags
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Smith Engr. Wks.

Sand and Gravel Plants
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co., The
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Sand Lime Brick Machinery
Diamond Iron Works, Inc.
Jackson & Church Co.
Jeffrey Mfg. Co.

Sand Separators
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Smith Engineering Wks.

Sand Settling Tanks
Eagle Iron Wks.
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Smith Engr. Wks.

Classified Directory (Cont.)

Scales (Hopper)
Blaw-Knox Co.

Scrapers (Power Drag)
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Hayward Co., The
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Sauerman Bros.

Scrapers (Wagon)
Bucyrus-Erie Co.

Screen Cloth & Plates (Perforated)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perforating Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.

Screen Parts
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Pioneer Engr. Wks.
Screen Equipment Co.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Screens
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Rogers Iron Works Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens (Grizzly)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Gay, Rubert M., Div.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Pioneer Engr. Wks. Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Ross Screen & Feeder Co.
Screen Equipment Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Road Machinery Co.
Universal Vibrating Screen Co.

Screens (Laboratory)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Roebling's, John A., Sons, Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Gay, Rubert M., Div.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt
Roebling's, John A., Sons Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Road Machinery Co.

Screens (Rotary)
Link-Belt Co.
Smith Engr. Wks.

Screens (Scalping)
Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engr. Wks.
Williams Patent Crusher & Pulv. Co.

Screens (Trommel)
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Screens (Vibrating)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Roebling's John A., Sons Co.
Rogers Iron Works Co.
Screen Equipment Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Washing)
Link-Belt Co.
McLanahan & Stone Corp.
Screen Equipment Co.

Scrubbers (Washers)
Link-Belt Co.
McLanahan & Stone Corp.
Rogers Iron Works Co.
Smith Engr. Wks.
Tyler, W. S., Co.

Seal Rings
Traylor Engr. & Mfg. Co.

Semi-Trailers, Quarry (Side and End Dumping)
Easton Car & Construction Co.

Shafting
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Shale Planers
Eagle Iron Works

Sheaves
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Hetherington & Berner
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Ransome Concrete Machinery Co.
Pioneer Engr. Wks.
Roebling's, John A., Sons Co.
Sauerman Bros.

Shovels (Compressed Air)
Nordberg Mfg. Co.

Shovels, Power (Diesel, Diesel-Air Electric, Gasoline, Gas-Electric, Oil, Steam)
Austin-Western Rd. Machinery Co.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Classified Directory (Cont.)

Shovels (Tractor)
Austin-Western Rd. Machy. Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Shovels (Truck)
Link-Belt Speeder Corp.

Shovels (Underground)
Allis-Chalmers Mfg. Co.
Lima Loco. Wks., Inc. (Shovel & Crane Div.)
Nordberg Mfg. Co.

Shredders
Williams Patent Crusher & Pulv. Co.

Sieves (Testing)
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Tyler, W. S.

Silos (Storage)
Blaw-Knox Co.
Smidth, F. L., & Co.

Silo Stave Machines (Concrete)
Besser Mfg. Co.

Skids
Besser Mfg. Co.
Easton Car & Construction Co.

Slakers (Rotary)
Traylor Engr. & Mfg. Co.

Slugs (Grinding)
Smidth, F. L., & Co.

Slurry Mixers
Smidth, F. L., & Co.

Slurry Separators
Smidth, F. L., & Co.

Slurry Thickeners
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Smokestacks
Traylor Engr. & Mfg. Co.

Speed Reducers (Gear, etc.)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Spouts
Jeffrey Mfg. Co.
Link-Belt Co.
Ransome Concrete Machinery Co.
Traylor Engr. & Mfg. Co.

Sprays & Spraying Equipment
Link-Belt Co.

Sprockets
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.

Stabilization Equipment
Barber-Greene Co.
Besser Mfg. Co.
Pioneer Engr. Wks.

Standpipes
Ross Screen & Feeder Co.

Steel (Abrasive-Resisting)
Ryerson, Jos. T., & Son, Inc.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel (Open-Hearth)
Timken Roller Bearing Co.

Steel (Special Alloy)
Chicago Steel Foundry Co.
Timken Roller Bearing Co.

Stokers
Combustion Engr. Co., Inc.
Link-Belt Co.

Storage Equipment
Barber-Greene Co.
Blaw-Knox Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Strippers (Concrete)
Anchor Concrete Machinery Co.
Multiplex Concrete Machinery Co.

Switchboards
Allis-Chalmers Mfg. Co.
General Electric Co.

Tachometers
General Electric Co.

Tampers (Power & Hand)
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machinery Co.

Tanks (Air, Storage, etc.)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Combustion Engr. Co.
Eagle Iron Wks.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Raymond Pulv. Div.
Traylor Engr. & Mfg. Co.

Tires and Tubes
Goodyear Tire & Rubber Co.

Towers
Blaw-Knox Co.
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machinery Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Track and Track Equipment
Besser Mfg. Co.
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Track Systems (Overhead)
Jeffrey Mfg. Co.
Link-Belt Co.

Tractors
Allis-Chalmers Mfg. Co.
Koehring Co.

Tractors (Electric)
Link-Belt Co.

Trailers (Industrial, Quarry)
Allis-Chalmers Mfg. Co.
Athey Truss Wheel Co.
Austin-Western Rd. Machinery Co.
Easton Car & Construction Co.
Ford Motor Co.
Koehring Co.
Link-Belt Speeder Corp.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.

Trench Hoes
Link-Belt Speeder Corp.

Trucks (Agitator)
Blaw-Knox Co.
Jaeger Machine Co.
Smidth, F. L., & Co.

Truck Bodies (Dump)
Athey Truss Wheel Co.
Commercial Shearing & Stamping Co.
Dempster Bros.
Easton Car & Construction Co.
Ford Motor Co.

Trucks (Dump)
Ford Motor Co.

Trucks (Electric)
Easton Car & Construction Co.

Trucks (Gas-Electric)
Easton Car & Construction Co.

Trucks (Industrial)
Easton Car & Construction Co.

Trucks (Mixer)
Blaw-Knox Co.
Jaeger Machine Co.
Ransome Concrete Machinery Co.
Smidth, F. L., & Co.

Tubing (Seamless Steel)
Timken Roller Bearing Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.

Turnbuckles
Macwhyte Co.

Turntables (Industrial)
Easton Car & Construction Co.

Unloaders (Car, Bin, Truck, etc.)
Barber-Greene Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M., Div.

Classified Directory (Cont.)

Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Universal Road Machinery Co.

Unloaders (Boat)
Link-Belt Co.

Unloaders (Box Car)
Barber-Greene Co.
Besser Mfg. Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M., Div.
Jeffrey Mfg. Co.
Link-Belt Co.
Universal Road Machinery Co.

Unloaders (Pneumatic)
Fuller Co.

Unloaders (Underground)
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

Ventilating Apparatus
Blaw-Knox Co.

Vibrators (Bin and Concrete Form)
Besser Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Tyler, W. S., Co.

Vibrating Screens
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machinery Co., The
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Co.
Nordberg Mfg. Co.
Robins Conveying Belt Co.
Pioneer Engineering Wks.
Screen Equipment Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Wagons (Dump)
Allis-Chalmers Mfg. Co.
Athey Truss Wheel Co.
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Easton Car & Construction Co.
Koehring Co.

Washers (Log)
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Washers (Sand, Gravel & Stone)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Gay, Rubert M., Div.
Jeffrey Mfg. Co.
Lewiston Fdry. & Machy. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Road Machinery Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.

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Schaffer Poidometer Co.

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Welding Rods
Roebling's, John A., Sons Co.
Ryerson, Jos. T., & Son, Inc.

Welding Wire
Hazard Wire Rope Div.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wheels (Tracklaying Type)
Athey Truss Wheel Co.

Winches
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Link-Belt Co.
Robins Conveying Belt Co.

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Bacon, Earle C., Inc.
Cleveland Wire Cloth & Mfg. Co.
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
Pioneer Eng. Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Screen Equipment Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.

Wire (Copper, Iron & Steel)
General Electric Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire (Electric)
General Electric Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope
American Cable Co.
Hazard Wire Rope Co.
Macwhyte Co.
Leschen A., & Sons, Rope Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Clips
American Cable Co.
Hazard Wire Rope Co.
Leschen A., & Sons
Laughlin, Thomas, Inc.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Fittings
American Cable Co.
Hazard Wire Rope Co.
Leschen A. & Sons, Rope Co.
Laughlin, Thomas, Inc.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Hooks
American Cable Co.
Hazard Wire Rope Co.
Laughlin, Thomas, Inc.
Leschen A., & Sons, Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Lubricants
Macwhyte Co.
Roebling's, John A., Sons Co.
Texas Co., The

Wire Rope Slings
American Cable Co.
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.
Macwhyte Co.
Roebling's, John A., Sons
Wickwire-Spencer Steel Co.

Wire Rope Sockets
American Cable Co.
Hazard Wire Rope Co.
Laughlin, Thomas, Inc.
Leschen, A., & Sons Rope Co.
Macwhyte Co.
Roeblings, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Thimbles
Laughlin, Thomas, Inc.
Macwhyte Co.

Wire Turnbuckles
Laughlin, Thomas, Inc.

Classified Advertisements

GRAVEL PLANT EQUIPMENT

By Owner

Bucyrus 50-B Elec. Shovel—440 V.—60 cyc.—1½ Yd.	No. 4651	150 HP Motor	GE	220 V. 3 ph. 600 RPM
20 Ton Amer. Hoist & Derrick Crane, steam 1½ Yd.	No. 1115	50 HP Motor	WEST	220 V. 3 ph. 1120 RPM
7′ Newhouse Crusher	No. 8286	50 HP Motor	GE	220 V. 3 ph. 900 RPM
Scalper Screen—72″ x 12′—Galland Henning.		50 HP Motor	GE	220 V. 3 ph. 900 RPM
Washing Screen—60″ x 12′—Galland Henning.		30 HP Motor	GE	220 V. 3 ph. 1800 RPM
6″ Fairbanks Morse pump—direct conn. 50 HP motor.		30 HP Motor	GE	220 V. 3 ph. 720 RPM
10″—CI pipe—70 lb. rail—24″ belt.		25 HP Motor	GE	220 V. 3 ph. 720 RPM
Head and tail pulley assemblies—rollers and idlers.		15 HP Motor	GE	220 V. 3 ph. 1200 RPM
		15 HP Motor	WEST	220 V. 3 ph. 860 RPM
		5 HP Motor	GE	220 V. 3 ph. 1200 RPM
		5 HP Motor	Allis-Chal.	220 V. 3 ph. 1200 RPM

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Complete Common Brick Manufacturing Equipment, located in southeastern Penna. AutoBrik Machine, Steam Rack Dryer, 30,000 capacity, conveyor Systems, etc. **Address Box 910, care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.**

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Reconditioned pipe, new threads and couplings, all sizes, ¾ in. to 36 in., guaranteed suitable for all practical purposes.

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WOODFORD ELECTRIC ORE HAULAGE SYSTEM

Including ten 10-cu. yd. standard gauge side-dump cars, double-motored; all necessary electrical control equipment; Motor-Generator Set; rails, etc.

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NEW YORK, N. Y.

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5′ X 10′ Allis Chalmers Rod Mill.
8 Cell Denver SUB A Flotation Cell.
6′ x 13′ Rake Classifier.
6 Ft. 2 leaf American Oliver Filter.
Large stock Air Compressors.

Wm. C. Johnson & Sons Machinery Co.
1211 Haldey Street St. Louis, Mo.

IMMEDIATE DELIVERY!!

¾ yd. Northwest No. 3 Gas Shovel & Dragline.
22 ton Browning No. 8C Locom. Crane, New 1927.
2½ yd. Northwest 80D Diesel Quarry Shovel.
1050 ft. Ing. Rand 2 stage Compressor with 200 HP GE Synchronous motor. PRE 2.
80, 100, 120, 180 HP Fairbanks and Atlas Diesel Units. 48 HP Cummins 4 cyl.
150 HP Scotch Marine type Boiler, Retubed.
20—45 ton Plymouth Gasoline Locomotives.
All Sizes Crushers-Shovels-Cranes-Compressors
MISSISSIPPI VALLEY EQUIPMENT CO.
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ALL SECTIONS

Also contractors' equipment, "V" shaped and Western cars, 24 and 36-in. gauge, portable track, gas locos, frogs and switches. Attractive prices quoted. Wire, write or telephone for quotations.

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ELECTRICAL MACHINERY

Motors and Generators, A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.
Fort Wayne, Indiana

"E. C. A. Rebuilt" Quarry and Gravel Plant Equipment

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Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

BINS

1—150 ton 3 cpt. Blaw Knox; 1—118 ton Blaw Knox; 2—85 ton Heltzel; 1—72 Blaw Knox; 1—46 yd. Johnson offset; 1—60 ton Butler V-40; 2—35 ton Blaw Knox; 1—26 ton Heltzel with Kron dial scale. All above with or without volume or weigh batchers.

2—Cement Plants: 1—1,200 bbl. Blaw Knox; 1—275 bbl. Johnson, portable.

BUCKETS

26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.

6—Dragline: 1—1⅝ yd. Northwest; 1—1½ yd. Omaha; 1—1¼ yd. Page; 2—1 yd. Hayward; 1—⅞ yd. Page; 1—1½ yd. Pioneer Cableway Excavator bucket.

7—Dragscraper: 2—1 yd Sauerman; 1—1 yd. Green; 1—¾ yd. Garst; 2—½ yd. Garst.

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4—18" Steel frame belt conveyors: 3—Barber-Greene, 60', 45' and 24'; 1—National 30'.

11—Bucket elevators: Rex and Weller, on chain or belt; all sizes.

CRANES, DRAGLINES & SHOVELS

1—Link Belt Mod. K-85 combination dragline and shovel Ser. No. 1696, gasoline power, 70' dragline boom, 2 yd. shovel front.

1—Page, Model No. 411 Diesel crawler dragline, 70' boom, 2 yd. bucket.

1—P & H Model No. 650, Serial No. 4188, 65' boom; 1¼ yd. bucket.

1—Link-Belt K-42, combination shovel, crane and trench hoe, Serial No. 1265, 1¼ yd. shovel front, 60' crane boom.

2—Northwest, Model 105, Serial No. 2053 & No. 1522 40' boom, 1 yd. bucket.

1—Link-Belt, K-1, Serial No. 1024, 50' boom, 1 yd. bucket.

2—Osgood Heavy Duty, Serial No. 2069 & No. 2087, combination 1 yd. shovel and crane, 40' boom.

2—Thew, Model "0" combination shovel crane and dragline, Serial No. 2601 & No. 2687, ⅝ yd. shovel fronts, 40' crane boom.

1—P & H Model No. 206, 40' boom, ⅝ yd. bucket.

1—Byers Bearcat, Serial No. 3299, 30' boom, ½ yd. bucket.

SEND FOR NEW ORANGE PEEL STOCKLIST

DREDGE PUMPS

1—12" Morris Heavy Duty D.C. to 100 H.P. dbl. cyl. steam engine.

4—Belt Driven: 3—Morris Mang., 1—10", 1—8"; 1—6"; 1—Fairbanks-Morse Woods 6".

CRUSHERS

6—Jaw Crushers: 1—12"x26" Champion; 1—12"x20" Acme; 2—10x20" Climax No. 2½; 1—9x16" Telsmith No. 9-A; 1—9x15" Champion.

3—Gyratory: 1 No. 5 Gates; 1 No. 3 McCully; 1 No. 0 McCully.

1—Set of Allis Chalmers, smooth type crushing rolls, 42x16".

TRACTORS AND SCRAPERS

4—13 yd. LeTourneau Type BY scrapers with Caterpillar D8 Diesel tractors, new 1938.

WHIRLEY

1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75' boom, 2D, Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

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All Reconditioned Our Works
13 cars 20 cu. yd.—40 tons Cap.
Lifting Sides
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Drop Sides
Location—Pittsburgh District
Prices—Exceptionally Attractive

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330 GRANT ST. PITTSBURGH, PA.

1—1500 Ton Butler 5 Compartment Storage Bin.
1—130 bbl. Blaw-Knox Cement Bin.
2—300 bbl. Blaw-Knox Cement Bins.
15—Compressors, 528-2600 cu. ft. cap. Gas, Diesel, Electric. Stationary and Portable.
21—Boilers—20 to 150 H.P. Vertical and Horizontal—High Pressure.
60—Hoists, 1-2-3 Drum, steam, gas and electric.
5—Derricks, Steel Stiff Leg, 10 to 25 tons capacity.
12—Locomotives, 8 to 40 tons—Gas—all gauges.
30—Flat Cars—36" gauge.
15—Buckets and Belt Conveyors—All sizes.

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Butler batching plant, 5 compts., cap. 105 yds. aggregate, 200 bbl. cement, weighing devices, elevator, conveyors, complete.
225 bbl. Erie bulk cement plant, complete.
155 bbl. Fuller cement bin, electric batcher.
Blaw Knox 270 bbls. bulk cement plant, complete.
Pumpcrete machines, Models 180, 190 & 200.

CRUSHERS—PULVERIZERS—SCREENS—FEEDERS

Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 18x36, 24x36.
Gyratory: K.V.S. 19, 25-S, 30, 37-S, 49; Telsmith 8A; Traylor 8".
Superior McCully 13", 8", 6".
Jeffrey Type A 30" x 24" pulverizer.
Jeffrey 24" x 24" spiked roll crusher.
Robbins apron feeders, 18" x 6', 24" x 6'.
Traylor apron feeder, 5' x 15'.
Bucket elevator, 32' chain, buckets 8"x6"x12".
3' x 6' K. V. S. single deck, vibrating.
3' x 6' 3 decks, vibrating.
3' x 6' Telsmith, 2 deck, vibrating screen.
48" x 20' Allis Chalmers revolving scalping screens, full manganese.
Robbins 4x8 double deck Gyrex vib. screen.

CRANES—SHOVELS—DRAGLINES

Whirley, 25 tons cap., 85' boom, electric.
42-B Bucyrus Erie Diesel 2 yd. shovel.
41-B Bucyrus Erie comb. crane and shovel. Steam.
P & H Model 650 crane, 60' boom.
Northwest No. 4 crane and backhoe.
Lorain Model 40 truck crane.
Lima Model 101 crane, 1¼ yd.
Ohio 25 ton locomotive steam crane, 60' boom.

BUCKETS

Hayward clamshell, 1 yd., rehandling.
Hayward clamshell 1½ yd. rehandling.
Owen ½ yd. Type M digging clamshell.
Sauerman Crescent drag scraper, ⅝ yd.
Blaw-Knox 1 cu. yd. dragline bucket.

CONVEYING EQUIPMENT

Barber Greene conveyor, 24" x 200', complete.
8 Barber Greene conveyors, 24" x 35', type N.
New conveyor belt, special stock, 14" to 48".
Head & tail pulleys, take-ups, rollers, idlers.

MISCELLANEOUS

120 HP gas engine, clutch, tex rope pulley.
4 I. R. Wagon drills, FM-2, pneumatic tires.
Complete stone washing plant. Write for details.
I. R. Model 50 Leyner drill sharpener.
I. R. Model JE electric bit grinder.
Gas locomotives, 2½ to 25 tons.
Dredge pumps, 6", 8", 10", 12", 16".

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Synch. Motor Generators

750 KW WEST., 250 V., 2400 A.C., 900 RPM
300 KW G.E., 250 V., 2300/4000 A.C., 1200 RPM
300 KW G.E., 250 V., 2300/4000 A.C., 720 RPM
200 KW G.E., 250 V., 2300/4000 A.C., 1200 RPM
200 KW G.E., 550 V., 2300/4000 A.C., 1200 RPM
150 KW WEST., 250 V., 2300/4000 A.C., 1200 RPM
100 KW G.E., 250 V., 2300 A.C., 1200 RPM

Air Compressors

1302' I-R, PRE-2, Dir. Con. Syn. Mt. 440 V., 100 lb.
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Each unit listed above is owned by us and is only a small part of our large stock, consisting of Synchronous Converters, Transformers, Motors, Coal Crushers, Wheel Presses and Trolley and Battery Locomotives.

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SPECIALS MUST MOVE QUICKLY

2—1578 CFM, I.R., PRE 2
Synchronous Motor Driven
2—1300 CFM, C.P., OCE
Synchronous Motor Driven
1—1300 CFM, SULLIVAN, WN3
Synchronous Motor Driven

Also a full line of CRUSHERS; SCREENS; DRYERS; KILNS; BALL-MILLS; PULVERIZERS; AIR CLASSIFIERS; Etc.

BRILL EQUIPMENT CORP.
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2—10 inch Steel Portable Dredges
1—15 inch Steel Portable Dredge

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303 West 42nd Street New York City

DIESEL GENERATOR PLANT

SIX 360 HORSE-POWER UNITS

2160 HORSE-POWER

Individual Units Can Be Purchased.
Immediately Available for Re-Installation and Service.
Inspection in Operation. Full Information on Request.

A. G. Schoonmaker Corporation
38 Hudson St. Phone Bergen 4-5300 Jersey City, N. J.

Kiln-Dryer, 8' x 80' Ruggles-Coles. A-1 shape.
Steam Shovel—Marion 37, inc. crane-drag. boom.
Hammermill—Williams No. 6 Jumbo. Sacrifice.
Sauerman Eqpmt.—Hoists, buckets, etc., 1/3 to 4 yds.
Diesel-Electric drag-crane, 115' boom. Best offer.
Belt Conveyors—24" x 40', 60', 80', & 90'.
Crushers—2' Cone, 10" Newhouse, 10" Sup-McCully.
Screens—4x8 A-C, 2 deck. 3x6 Simplicity, 3 deck.
125 KW Diesel-Generator unit, 250 volt DC.

JAMES WOOD
53 W. JACKSON BLVD. CHICAGO, ILL.

RECENT PURCHASES

To maintain our stock against the increasing scarcity of good used machines.

At Plant of Former Emeralite Rock Products Co., Ely, Minnesota

REPRESENTATIVE ON PREMISES*

CRUSHERS:

Finishing Crushers:
2—2′ Symons Cone Crushers.
1—No. 37 Kennedy Van-Saun Gearless Reduction Crusher.

Jaw Crushers:
2—24x36″ Farrel.
2—8x36″ Universal Reduction.

ELECTRIC SHOVEL:
1—1¼ yd. Osgood, 50 H.P. 3/60/440 volt slip ring Motor. Shop No. 2321.

CRUSHING ROLLS:
7—Sets of 24″ dia. x 14″ Allis-Chalmers.
1—Set of 20″ x 14″ Sturtevant, balanced type.
1—Set of 36″ x 16″ Sturtevant.
1—Set of 26″ x 14″ Allis-Chalmers.

VIBRATING SCREENS:

Tyler Hummer Screens:
18—Tyler Hummers; 11—3′x5′, 4—4′x5′ all double deck.
1—3′x5′, 1—4′x5′ triple deck.
1—Tyler Rotap Testing Screen, motor driven.
4—Motor Generator Sets for operating Tyler Screens; 1—KW, 2—KW and 2 1½—KW.

Mechanical Screens:
2—3′x5′ Leahy, single and double deck.
1—4′x7′ Leahy, double deck.
4—3′x6′ Sturtevant Moto-Vibro No. 2, double deck, set in two batteries.

Revolving Screen:
1—4′x10′.

ROTARY DRYERS:
1—5′x30′ Buckeye, with Schur oil burner, oil pump and No. 45 Clarage Exhauster.
1—4x30′ with Schur oil burner.
1—4x40′.

BELT CONVEYORS:
1—16″ x 160′ c/c.
2—16″ x 85′ c/c.
1—16″ x 35′ c/c.
1—16″ x 48′ c/c.
1—18″ x 100′ c/c.
1—24″ x 210′ c/c.
1—24″ x 80′ c/c.
All Rex-Stearns Troughing and Return Idlers.

BUCKET ELEVATORS:
10—Steel and Wood Encased, various sizes.

MISCELLANEOUS:
2—18x25″ Dings Magnetic Pulleys, with Motor Generator Set.
1—7x6″ Ingersoll Rand ER-1 Air Compressor.
1—No. 10 XRB Ingersoll-Rand Air Compressor.
1—79 H.P. Slip Ring Motor.
1—150 amp. Lincoln Electric Welder, portable.
Machine Shop Equipment.
Blacksmith Shop Equipment.
Laboratory Equipment.
75 MOTORS, 3/60/440 volts, from 1 H.P. to 200 H.P.

Send for detailed catalog of equipment at this plant.

At Chenango Valley Sand & Gravel Corp. Plant, Sherburne, New York

35 miles South of Utica.

REPRESENTATIVE ON PREMISES*

1—3′ Symons Cone Crusher, coarse bowl.
1—2′ Symons Cone Crusher, fine bowl, with small D.C. 30 H.P. motor, No. 2125.
1—12″x20″ Acme Jaw Crusher, Size 9-AA.
1—30″x20′ c/c Belt Conveyor.
1—24″x160′ c/c Belt Conveyor.
Stearns 3-roll 6″ Idlers.
3—Revolving Screens 4′x16′, 4x18, 4x24.
2—Traylor FB-2 Vibrating Screens, 2-deck, 41″x72″.
4—Type FB-4 Traylor Vibrating Screens, 4x7′, double deck.
1—Type FB-2 Traylor Vibrating Screen, 41″x6′, single deck.
2—Open Bucket Elevators, approx. 75′ c/c, belt type buckets 18″ w. x 12″ x 11″. Good Roads Mchry. Co.
1—6″ Rumsey Centrifugal Pump.
1—Wash Box, 4′ wide blades, 24′ centers.
2—Wash Boxes, about 24′ c/c, with 6x36″ rakes.
1—6″x5″ Goulds Cent. Pump with 20 H.P. motor.
3—75 KVA Westinghouse Transformers.
9—Motors, all 3/60/220 volts—5, 15, 20, 30 and 75 H.P.

Another Complete Plant in Michigan

Individual items to be sold.*

2—150 H.P. Fairbanks-Morse Oil Engine Generator Sets, engines 257 RPM.; Style V Generators, Fairbanks-Morse 100 KW, 2/60/220 volts. With belted exciters, air and oil tanks, switchboard, etc.
1—18″x30″ Allis-Chalmers Jaw Crusher.
1—Allis-Chalmers Gyratory Crusher No. 7369.
2—No. 2F Telsmith Reduction Crushers.
2—24″ Symons Horizontal Disc Crushers.
7—Sets of Crushing Rolls; 5—24″ dia. x 14″ Allis-Chalmers; 1—26x14″ Allis-Chalmers; 1—36x14″ Allis-Chalmers.
4—3′ x 6′ Sturtevant Vibrating Screens, double deck.
3—6′ x 12′ Mechanical Vibrating Screens, 3-deck, made by Lake Shore Iron Works.
1—12 x 10 Chicago Pneumatic Air Compressor with 75 H.P. motor.
5—2 yd. Koppel Dump Cars, 24″, roller bearings.
10—Bucket Elevators, belt type, various sizes.
1—10x24′ Welded Steel Oil Tank.
15—Motors, all 2/60/220 volts, from 5 to 70 H.P.

Remaining at Former J. B. Preston Co. Plant in Granville, New York

REPRESENTATIVE ON PREMISES*

3—Jaw Crushers: 30x15″, 16x10″ Farrel; 16x10″ Traylor.
2—3′x6′ Sturtevant Moto-Vibro Screens, double deck.
1—Jumbo Rotex Sifter with 2—3′x11′ separate screens, triple deck—boxes mounted on one frame.
2—Revolving Screens; 3′x8′, 3x11′.
8—Motors, all 3/60/550 volts—7½, 25, 22, 30, 35, 40 and 65 H.P.
1—16″x125′ c/c Belt Conveyor.
1—Bucket Elevator 40′ c/c, 8x5″ buckets.

OTHER PURCHASES!

3—No. 60 RAYMOND IMP TYPE PULVERIZERS, each with 60 H.P. 3/60/440 volt direct connected motor, and feeder motor.
2—5-roll Raymond Mills, high and low side.
1—3-roll Raymond High Side Mill.
2—10′ Sturtevant Air Classifiers.
1—16 ton Whitcomb Gas. Loco., std. gauge, 90% new.
5—10′x30′ Vertical Steel Tanks or Bins.
1—4′ Traylor No. 410-TZ Finishing Crusher, also 3 ft.
2—5′x12′ iron lined Rod Mills.
1—5′x22″ Hardinge Conical Ball Mill, iron lined.
2—Indirect Heat Rotary Dryers, 80″x65′ and 69″x40′, L. R. Christie Co., Type BV.
2—8′x60′ Ruggles Coles single shell direct heat Rotary Dryers.
1—600 K.W. Skinner Unaflow Engine Generator Set.

****Inspection invited of any of this equipment which can only remain at present location for a limited time. Anticipate your needs. Send all inquiries to:***

CONSOLIDATED PRODUCTS CO., Inc.

15-16-17 PARK ROW — NEW YORK, N. Y.

OUR SHOPS AT NEWARK, N. J., COVER EIGHT ACRES

HYDRATORS
3 Kityer & Schultless Hydrators.
AIR COMPRESSORS
BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 676, 807, 1302, 1722 & 2200 Ft.
DIESEL: 603, 807 & 1000 Ft.
PORTABLE GAS: 110,160,220,310,540 & 1300 Ft.
STEAM: 40, 310, 528, 1300, 2200 & 3600 Ft.
CLAMSHELL BUCKETS, SKIPS & GRAPPLES
Owen B. A & H Stone Grapples.
2 Yd. OWEN Type S Material Handling.
1¼ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E.
48 Steel Skips 6½ x 6 x 2½.
5 Ton Bucyrus Rack Grabs.
CRANES AND DRAGLINES
¾ Yd. 5 Ton O & S 30 Ft. Boom.
12 Ton NORTHWEST 50 Ft. Boom Gas.
25 Ton BROWNING & 20 Ton AMERICAN Loco.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
CATERPILLAR SHOVELS
¾ Yd. Bucyrus 10B Electric & ¾ yd. Nisley Gas.
2 Yd. Marion Steam Shovel.
¾ Yd.,1¼ Yd.,2 Yd. & 4 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas.
1½ Yd. BUCYRUS 41B Steamer.
4 Yd. Bucyrus 120B Electric. Also 3 yd. Erie Elec.
DUMP CARS
46—KOPPEL 1½ Yd. 24 & 30 In. Ga.,V Shaped.
15—2 Yd., 3 Yd., 4 Yd., 6 Yd., 12 Yd., 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd.Cap.
15—Std. Ga. 50 Ton Battleship Gondolas.
FLAT CARS
9—50 ton std. ga. heavy duty flat cars.
HOISTING ENGINES
Gas: 15, 30, 60, 100 & 120 HP.
Electric: 30, 52, 90, 100 & 150 HP.
Steam: 6¼x8, 7x10, 8½x10, 10x12, 12x14.
DIESEL UNITS
75, 90, 180, 240 HP F. M. Engines.
110 HP Ingersoll Rand Engine.
175 KVA Worthington 3/60/2300.
275 KVA Fairbanks 3/60/2300.
BALL, ROD AND TUBE MILLS
6x8 Pebble Mill & 5x5 Batch Mill.
3'x8" & 5'x22" HARDINGE CON. Dry Ball Mill.
3'x36" HARDINGE CONICAL Wet Ball Mill.
6'x22" HARDINGE CONICAL Pebble Mill.
8'x22" HARDINGE CONICAL Ball or Pebble Mill.
4x8, 8x6 & 10x9 Straight Ball Mills.
4x16, 5x18 & 5x22 Tube Mills & 6'x22'.
3½x8 & 5x7 Air Swept Tube Mills.
2x4½, 3x10 & 5x12 ROD MILLS.
PULVERIZERS
JEFFERY 24x20 & 1½ Sturtevant R.R.
RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
RAYMOND Imp Mills No. 4, 32 & 55.
GRUENDLER XXB Mill & Jay Bee No. 3 & 4.
RAYMOND 4 & 5 ROLL MILLS & 5 ft.Chaser M.
STEEL STORAGE TANKS
10,000 Gal., 15,000 Gal. & 20,000 Gal. Cap.
MATERIAL BIN
110 Ton Blaw Knox 2 Compt.
400 BARREL CEMENT BIN
400 Barrel Butler Portable Steel Cement Bin with Fuller automatic batcher, push button control.
SEPARATORS AND COLLECTORS
Gayco 5 ft., 12 ft. and 14 ft. Separators.
Type 360 Sly 8x24,8x52 and 16x42 Dust Collectors.
ROLL CRUSHERS
36x60 Fairmount & 36x16 Allis Chalmers.
JAW CRUSHERS
10x8, 13x7½, 14x7, 15x9, 15x10, 16x9,16x12,16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 26x12,30x15,30x13 36x15, 36x30, 36x18, 36x14, 36x9,36x6,36x10,36x24, 42x9, 48x42, 48x36, 60x42, 84x60, 38x16, 9x36.
CONE & GYRATORY CRUSHERS
42 In. McCully Mammoth Gyratory.
5 No. 19, 25, 27 & 49 Kennedy.
18 In.,24 In.,30 In.,36 In.and 48 in.Symons Disc.
4—10 TZ Traylor 4 ft. Gyratory.
4—Nos. 5, 3 & 6 Austin Gyratory.
2—Traylor T-12 Bulldog Gyratory, also 16 inch.
8 In. Traylor T. Gyratory.
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½.
10 Inch Austin Model 105.
10 & 13 Inch Superior McCullys.
SYNCHRONOUS MOTOR GENERATORS
100 K.W. RIDGWAY 3/60/2200-250-275 volt, 1200 rpm.
150 K.W. GEN. ELEC. 3/60/2200-250-275 v., 1200 rpm.
200 K.W.RIDGWAY 3/60/2200-250-275v.,900 rpm.
SLIP RING MOTORS
52 H. P. GEN ELEC. 3/60/440 v., 1200 rpm.
(3) 100 H.P.GEN ELEC.3/60/440v.,900-1200 rpm.
CONVEYOR PARTS
BELT: 1000 Ft.60 In.,700 Ft.40 In.,600 Ft.36 In., 800 Ft.30 In.,1642 Ft.24 In.,517 Ft.20 In., 297 Ft.18 In., 500 Ft.16 In.,300 Ft.14 In.
IDLERS: 54 In.,42 In.,36 In.,30 In.,24 In.,20 In.,18 In.,16 In. & 14 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 Ft.24 In.,30 In.& 36 In. Sections.
ROTARY DRYERS AND KILNS
36 In.x20 Ft., 3 Ft.x30 Ft., 4 Ft.x30 Ft., 54 In. x 30 Ft. 42 In.x24 Ft. 5 Ft.x30 Ft. 5 Ft.x16 Ft. 5 Ft.x60 Ft., 6 Ft.x60 Ft.,6 Ft.x20 Ft., 6 Ft.x70 Ft.
RUBBER HOSE
Air ¾ to 1¼ in., Water ¾ to 10 in.
STEEL DERRICKS
GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom,25 Ton 100 Ft.Boom,75 Ton 135 Ft.Boom.
LOCOMOTIVES
GASOLINE: 2 Ton,5 Ton,8 Ton,12,14,and 20 Ton.
STEAM: 8 Ton,20 Ton,40 Ton,60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 40 Ton.
SCREENS
VIBRATING: 2x4, 3x8, 12x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72 & 4x12, 1, 2 & 3 Deck.
HUMMER, ROTEX, NIAGARA & ROBINS.
REVOLVING: 3x12, 3x16, 3½x18, 3x24, 4x16,4x20, 4x22, 4x24, 5x20, 5x30, 4x30.
COMPLETE PLANTS BOUGHT AND SOLD

R. C. STANHOPE, INC.

(Cable Address: "STANEQUIP" New York)
875 Sixth Avenue, New York, N. Y.

6½ yd. Shovel, Bucyrus, 320-B Electric
16—20 yd. Air Dump Cars, Magor, S.G.
4—20 yd. Air Dump Cars, Koppel, S.G.
36—5 yd. Hand Dump Cars, Western, 36" ga.
1—1000 G.P.M. Pump, 300' hd., 100 H.P., 3/60/2200
1—700 G.P.M. Pump, 200' hd., 50 H.P., 3/60/2200
1—10" AMSCO Manganese Pump
1—Compressor, 750 C.F.M., I-R Imperial 10, Steam
12—Hoist Motors, new, 50 H.P. & 25 H.P., 3/60/440
1—Tube Mill, 5' x 22' Allis Chalmers
1—25 ton Industrial Locomotive Crane, 50' boom
1—300 KVA Fairbanks Morse Diesel engine generator, 3/60/480
1—170 KVA Fairbanks Morse Diesel engine generator, 3/60/460
2—862 H.P. New Casey-Hedges Longitudinal Tube Boilers, never used.

Rails, Relaying; all sections. Cars, Hopper, Gondola, Ore, Tank, Flat, etc. Locomotives, all capacities and types.

Send for complete machinery bulletin!

IRON & STEEL PRODUCTS, Inc.

13490 So. Brainard Ave., Chicago, Ill.

24" gauge side and end dump cars.
Haiss Path Digging Loader on wheels.
Cletrac No. 40 on cats with 6 cyl Wisconsin engine.
Worthington belted two stage air compressor, 660 C F M.
Chicago 9"x8" N S B air compressor, 176 C F M.
Ingersoll 7"x6" E R-1 air compressor, 92 C F M.
Jaw Crushers: 9"x15", 9"x16", 10"x20", 12"x18".
Robins 28"x30" corrugated crushing rolls.
Gyratory 8" Taylor Bulldog crusher.
Jeffery No. 1 Swing Hammer Mill 15"x8".
Link-Belt 36" self contained steel apron feeder.
B-G and Fairfield 24" reciprocating plate feeders.
Telsmith No. 30 Rotary Grizzley.
150 head and tail pulleys for belt conveyor.
36" belt conveyor equipment 150' center.
30" belt conveyor equipment 300' center.
2—18" belt conveyor 160' and 200' center.
2—14" belt conveyor 60' and 100' center.
Automatic and hand operated belt trippers.
3 Gravity Take-ups for 24" belt.
Continues 50' elevator, 13" bucket on new belt.
Continues 55' elevator, 20" buckets on new belt.
Jeffery 14" bucket elevator on chairs, 30'.
Dragline buckets: ½ yd., 1 yd., 1½ yd.
¾ Blaw-Knox clamshell digging bucket.
¾ Hayward clamshell material bucket.
Goulds 6" centrifugal pump, 22 hp. motor.
10 electric centrifugal sumps, 100 g p m up.
Lidgerwood single drum 7½ hp. electric reversible hoist.
Tugger 1-H air hoist.
50 ton screw shoring jacks.
50 solid 1¼ octagon tool steel bars.
Patterson Kelley 800 hp. feed water heater.
2 Waukesha engines with clutch, 5"x6¼" and 5¾"x6¼" cyl.
16 Vibrating and revolving screens.
Overhead 6 tons Brownhoist crane, 20' span.
Westinghouse 50 hp. slip ring motor, reversible controller.

G. A. UNVERZAGT
15 PARK ROW, NEW YORK CITY

CRUSHERS

GYRATORY: 42" McCully with 80% brand new parts. 36" Allis-C. 20" Super, McCully conv. to 16". Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 5, 6, 8C, 9 & 16. Also Many Austins, Kennedys and Traylors, many sizes.

JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x30, 15x36.

REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36" TZ, 8", 10", 12" Super. McCully 6" & 10". Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2' to 4'.

ROLLS: Allis-C. 12½x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16, Etc., Etc.

HAMMERMILLS: Williams No. 1, 2, 3, 4, 6 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.

MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6 & 10x9. Hardinge 6'x3', 8'x30" & 6'x9'. Misc. Tube Mills 5' & 6' x 22'. Sturtevant Ring Roll, Raymonds, Kents, Fuller-Lehigh, Etc., Etc.

CRUSHING PLANTS: No. 65 Diamond, No. 22 Pioneer 8x24, 1036 Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Rollers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. **(I have equipment at many points in the United States and Canada. What you need may be near your plant.)**

ALEXANDER T. McLEOD
7229 Rogers Avenue **CHICAGO**

WE OFFER THE FOLLOWING STANDARD GAUGE SADDLE TANK

LOCOMOTIVES

at Very Attractive Prices
ALL THOROUGHLY RECONDITIONED

3—14x22 American 40 Ton
1—15x22 Porter 40 Ton
1—14x20 Porter 38 Ton
1—14x20 Vulcan 38 Ton
1—13x18 Porter 32 Ton
1—12x18 American 25 Ton

Complete Stock List on Request

BIRMINGHAM RAIL & LOCOMOTIVE CO.

BIRMINGHAM, ALA.

For Prompt Shipment Subject to Prior Sale

10 x 36 Gruendler Roller Bearing Crusher Plant with RA2P LeRoi Engine.

28' Elevator.

36 x 12' Screen.

30 Ton, 4 compartment Bin.

26' Reject Conveyor.
(Slightly used, as good as new)

NEW 15 x 36 Gruendler Roller Bearing Jaw Crusher.

NEW 24 x 36 Plain Bearing Jaw Crusher.

1—USED 10 to 15 ton per hour Gruendler Pulverizer.

1—NEW 10 to 15 ton per hour Pulverizer.

1—NEW 6 to 7 ton per hour Gruendler Pulverizer.

CRUSHER SERVICE

Box 795 **St. Louis, Missouri**

FOR SALE

USED EQUIPMENT

9x18 DIAMOND Roller Bearing Jaw Crusher.
10x20 DIAMOND Roller Bearing Jaw Crusher.
10x36 DIAMOND Roller Bearing Jaw Crusher.
15x36 DIAMOND Roller Bearing Jaw Crusher.
2'0"x4'0" Single Deck DIAMOND Vibrating Screen.

NEW EQUIPMENT

1—DIAMOND 9x16 Bronze Bearing Jaw Crusher mounted on truck with 15-20 H.P. engine Special price for quick sale.

Diamond Iron Works, Inc., and Mahr Manufacturing Company Div.

Minneapolis, Minn.

No. 19, 258, 49 Kennedy, TZ Traylor, 8A Telsmith Gyratory Crushers.
15x36", 24x72" Traylor Jaw Crushers.
4 Gardner Denver Derrick Drills, Model 21.
30x30", 40x15", 54x24" Crushing Rolls.
16, 18, 19 and 21 ton ST Locomotives.
1 yd. Koppel, 4 yd. Western 36" ga. Dump cars.
2 T and 3 W Monighan Walker, Bucyrus Erie 3 & 5 yd. Diesel-Electric Draclines.
90 HP Fairbanks Model 34B Diesel Engine.
Vibrating Screens, all makes and sizes.
Shovels, Cranes, Compressors, Conveyors, etc.
Anything and Everything for Quarry Operation.
Let us have your inquiries. Ask for Bulletin 47.

MID-CONTINENT EQUIPMENT CO.
710 EASTGATE **Pa 2290** **ST. LOUIS, MO.**

Used Equipment For Sale

Large Crushing Plant
66 x 84 — JAW CRUSHER
Secondary Crushers—Motors—Disc-crusher—Elec. Hoist—Conveyors—Elevators—Screens—Dust Collectors—Etc.
Box 913, Care of Rock Products, 205 West Wacker Drive, Chicago, Ill.

FOR SALE
New Elevator Buckets of all sizes. Also Bins and Tanks, Bolted or welded.
C. L. FIELDER COMPANY
Liberty Trust Bldg. Roanoke, Virginia

NEW AND USED PIPE FOR EVERY PURPOSE
Large stocks carried everywhere for spot shipment
Jos. Greenspon's Son Pipe Corp.
National Stock Yds. (St. Clair Co.) Ill.

FOR SALE
1—2½ Ton Plymouth Gasoline Locomotive 36" gauge.
1—4 Ton Brookville Gasoline Locomotive 36" gauge, equipped with McCormick Deering International Engine.
4—4 Yard All Steel Side Dump 36" gauge Koppel cars.
All the above in excellent condition. Address Box 911, care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.

RAILS—1 Ton or 1000
NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—New—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money. 'Phone, Write or Wire
L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

FOR SALE
Truck Crane—Orton, gasoline operated. Handles ½ yd. clamshell bucket.
Williams, ¾ yd., clamshell bucket.
Blaw Knox, ¾ yd., clamshell bucket.
Blaw Knox, ½ yd., clamshell bucket.
Gasoline Engine—Climax, Mod. K, 65 H.P. at 900 r.p.m. with Twin Disc clutch.
P. A. HENAULT
2140 Book Bldg. Detroit, Mich.

One 600-ft. Ingersoll Air Compressor Direct connected to 150 H.P. DeLe-Vergn Oil Eng. Very good condition, $1500.00. All makes Diesel Oil, and Gas Engines. Contractors Eqpt. Very good prices.
J. D. ANDERSON MACHINERY CO.
5516 Maple Ave.
St. Louis, Mo.

Concrete Products Equipment For Sale

FOR SALE
80 Chase Block cars in excellent condition. 15 Chase cars & Racks slightly pitted, 1200 ft. Steel track, (1) single (1) double transfer cars, 2 Chase turntables, 1 Anchor Automatic stripper with 6", 8" and 12" Mold boxes, 1 set of Stearns split bar Tampers and feet, 1500 two core 30% pressed steel 6" pallets, 2500 pressed steel 45% 8x8x12 pallets; all this material is priced to sell. **Comac Builders' Supply Corp., 16 Norman St., Rochester, N. Y.**

Used Equipment Wanted

WILL BUY FOR NEW PLANT:
3 Ft. or 4 Ft. Cone Crusher
24 x 36 or 36 x 42 Jaw Crusher
(3) 120 to 285 Ft. Belt Conveyors
¾ to 1¼ Yd. Gas or Elec. Shovel
(2) Vibrating Screens
100 to 200 H.P. Diesel Engine
P. O. BOX 679 DARIEN, CONN.

WANTED
Lime Hydrator, continuous type. Capacity 10 to 15 tons per hour, state price, condition and location. **Address Box 908, Care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.**

WANTED
A second-hand 4 or 5 roll Raymond high side mill in good condition. State lowest price, age and location. **Address Box No. 912, care of Rock Products, 205 West Wacker Drive, Chicago, Illinois.**

Business Opportunities

FOR SALE
Up to 5000 Acres of Tennessee
PHOSPHATE LANDS
Mineral Rights or Fee Simple
BEST AND SAFEST PLACE TO INVEST IDLE MONEY
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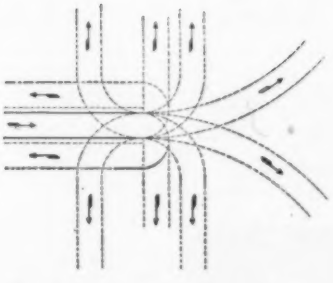

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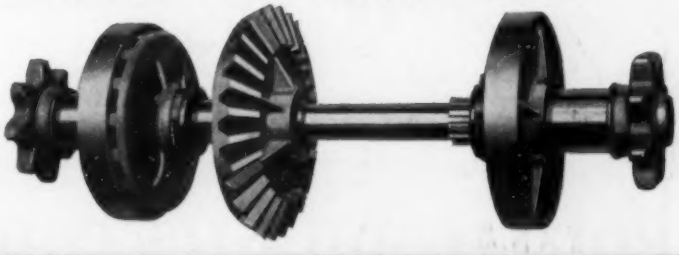

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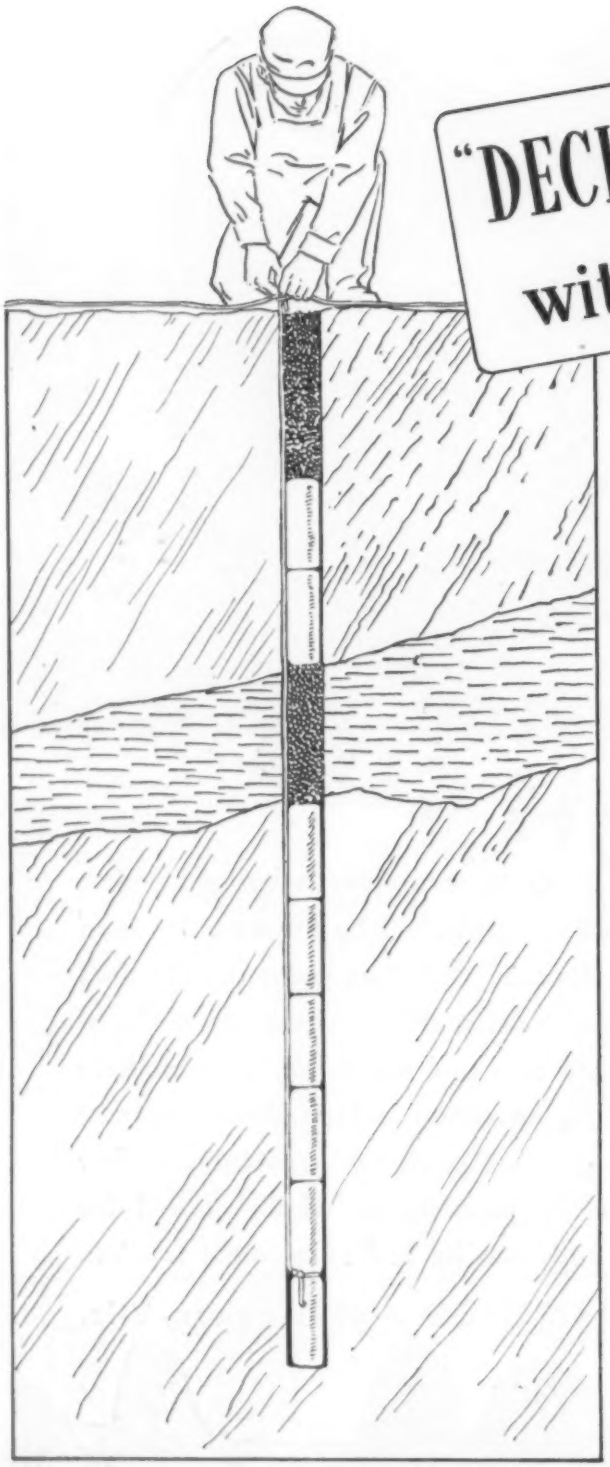

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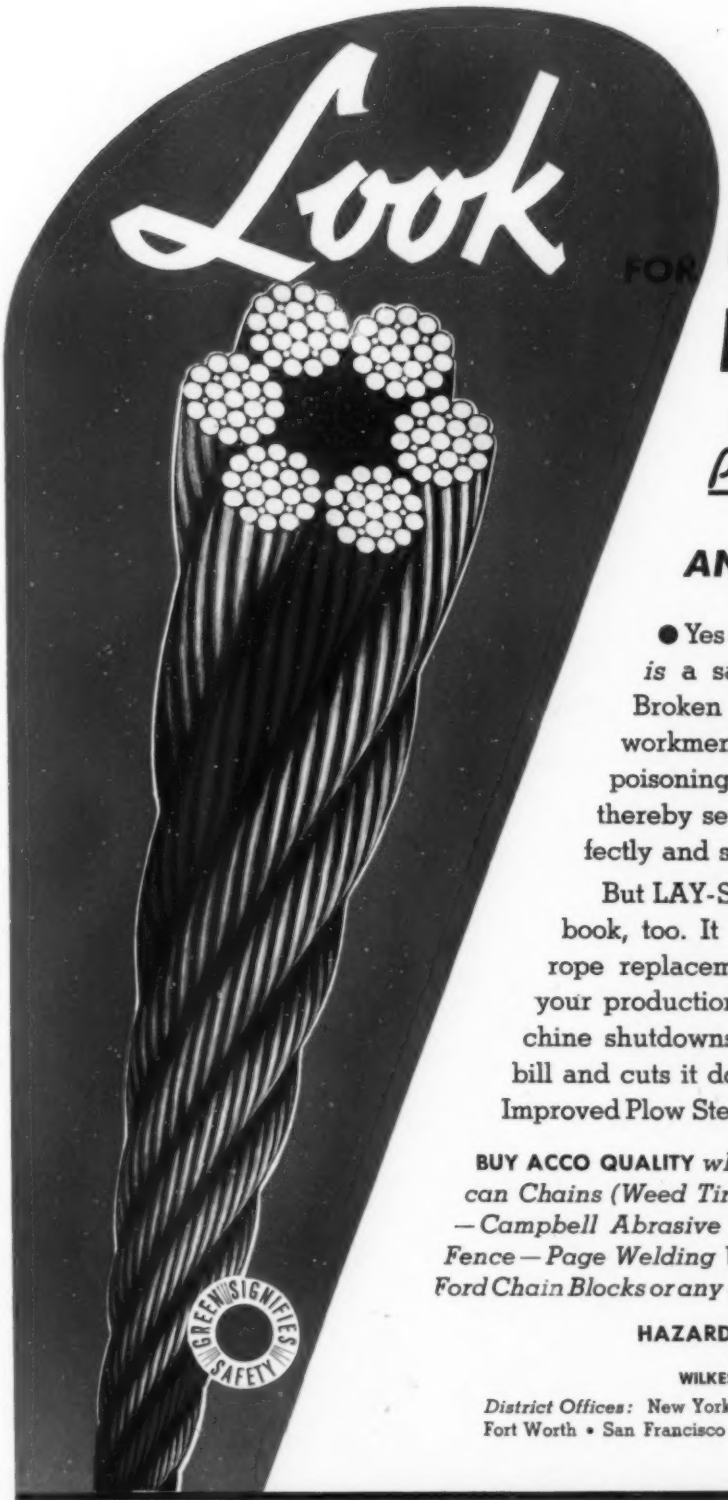

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